The Resonance – Dissonance Framework of Environmental Perception

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Abstract

Theorising and research in the field of environmental psychology has been dominated by two different schools of thought. The cognitive approach emphasises the primacy of cognitive processes on preference judgements between various types of environments and on the restorative effect of nature on humans. The competing psycho–evolutionary approach emphasises the primacy of affect. This theoretical fragmentation has contributed to environmental psychology's conceptual isolation in respect to its potential significance for other psychological sub–disciplines. This thesis proposes a new theoretical account, the "Resonance–Dissonance" (RD) framework of environmental perception, which provides a unifying framework for hitherto competing approaches in environmental psychology. It also seeks to contribute towards building and strengthening the tenuous or missing conceptual links between environmental psychology and other psychological sub–fields. A series of interlocking concepts, which bind together aspects of the relationship between perceivers and their immediate physical surroundings, is proposed to achieve this theoretical integration. Innate and culturally shaped needs and wants, in the form of mental structures providing reference patterns, are conceptualised as a fundamental aspect of the relationship between individual and environment. If the environment is appraised as having the agency to meet these needs, a state of resonance in the form of positive affect and cognitions ensues. Conversely, if the environment is appraised as not having this agency, a state of dissonance in the form of negative affect and cognitions emerges. These perceptually based cognitive–affective states are conceptualised to influence cognitions, emotions, behaviour, and physiology of the individual. Preference judgements and psycho–physiological restorative effects, as the main areas of theorising and research in environmental psychology, will be addressed. Possible theoretical implications, as well as practical applications, of the proposed RD framework on other psychological sub–fields are outlined and a tentative research programme is suggested.

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What are we looking at? — Introduction

Surgery patients recover more quickly if they have the opportunity to look through a window at trees and lawns. Participants of an anger control programme imagine being at a favourite place in order to relax and test participants consistently choose photographs of natural landscapes over urban scenes.

These are all fascinating facets of the intimate relationship between human beings and their physical environment. Over the past 30 years, environmental psychology has been the main psychological sub-discipline in pursuit of exploration and explanation of this special relationship. Theorising and research mainly has revolved around the themes of preference judgements on natural versus urban landscapes as well as that of uncovering environmental stimulus variables, which can be used to predict responses to variations *within* the nature category.

Secondly – and more recently – the direct beneficial and restorative effect of various natural environments on human psychological and physical health has been investigated. Two main schools of thought, putting the emphasis on cognitive (Kaplan, 1975, 1987; Kaplan & Talbot, 1983; Kaplan & Kaplan, 1989) and affective processes respectively (Ulrich, 1977; 1979; 1983; 1986; Zajonc, 1980), have emerged in this area and dominated the debate.

Unfortunately, theorising and research in the field of environmental psychology has been fragmented as documented in the number of incongruent concepts and the wide spread and variety of journals in which this field is being debated. At the same time this fragmentation has contributed to a certain degree of conceptual isolation in respect to environmental psychology's potential significance to other psychological sub-disciplines. While theory and research into all areas of interest to psychology at large have utilised "ecological variables" the conceptual links

between environmental psychology's findings and those of other psychological sub-disciplines such as clinical psychology and social psychology have remained tenuous or non-existent.

The "Resonance-Dissonance" (RD) framework of environmental perception, which will be proposed in this thesis is an attempt to contribute towards building and strengthening these tenuous or missing conceptual links. Its main aims are:

- to provide a conceptual framework contributing towards integrating a diverse array of approaches, theories and empirical findings within environmental psychology.
- to provide a conceptual link between a number of psychological sub-fields, such as environmental psychology, clinical psychology, social psychology, and industrial/organisational psychology.
- to generate an impetus for further research into the intimate relationship between human beings and their physical surroundings.

The RD framework of perception is intended to contribute towards a better understanding of how the perceiver meshes with the physical environment. If this relationship between individuals and their physical surroundings as inextricably linked components and not as completely separated entities can be better understood, applications in areas as diverse as clinical psychology, social psychology, architecture, and landscape design are possible.

The main overarching theme of the RD framework of perception is the notion, that human beings can be "in or out of tune" with their physical environment. On a fundamental level, basic phylogenetically developed adaptational needs of the individual do or do not mesh with the environment's agency to meet those needs. In the individual, these needs and wants are represented by mental templates about particular qualities of the physical environment. Other templates – or relevances as they will be called – represent threats to those needs and wants. In other words, mental representations of certain qualities of objects or other aspects of the environment such as sounds, odours etc., which render them likely or unlikely to meet the adaptational needs and wants, are present in the individual.

These postulated templates could be defined as innate mental yardsticks to appraise one's physical environment in terms of its benignity, that is the probability that one's basic and general needs and wants are being met. The environment's agency to meet these needs renders it relevant to the individual. These templates which are probably located in sub-cortical brain structures are viewed as stable and rigid products of an evolutionary process. In a continuous process from birth to death they are automatically and subconsciously applied to one's physical surroundings as a means of environmental appraisal.

"Being in tune" with one's environment then means that the postulated "need" templates are congruent with the discernible surrounding physical environment and that no "threat" templates match with the environment. An underlying positive affective frame, which can be described as a sense of affinity with one's physical surroundings is thought to be the hallmark of environmental resonance. Conversely, "being out of tune" represents a sense of alienation from one's physical surroundings. That is, a global negative affective state ensues if the perceiver's "need" templates are not matched by the environment and/or "threat" templates are matched.

	environment match	**environment mismatch**
need template	Resonance	Dissonance
threat template	Dissonance	Resonance

Figure 1: Resonance–Dissonance matrix

Beyond the survival and procreation oriented adaptational needs, other culturally given higher order needs and wants such as being respected, popular, rich, powerful, and being able to actualise oneself, are seen as being directed at the individual's environment in a similar way. Relevances representing these socioculturally moulded wants, however are more extensive schemata encompassing any number of related ideas, images, beliefs and pertinent general knowledge. These culturally given relevances are flexible and malleable and their content is changing. That is, a mental representation of certain qualities of objects, sounds, odours etc., which are pointing to their agency to meet these culturally

given wants, is being held by the perceiver. These schemata are a means to appraise particular objects, sounds, and odours in terms of their agency to meet or thwart the individual's specific wants. They are therefore much more linked to specific aspects of one's environment and could be defined as neocortex based cognitive extensions of the phylogenetically older appraisal mechanism targeted exclusively at survival relevant environmental properties.

Resonance in terms of the culturally given relevances refers to cognitive and affective states resulting from the realisation that particular objects, sounds, and odours possess qualities, which bestow them with the agency to meet one's specific wants. As these states emerge out of the match between the perceiver's relevances and particular object's discernible qualities, they are limited to the period during which the respective object can be sensed. It is therefore probably more appropriate to speak of "object resonance" in the case of a match between a culturally given relevance as part of the pertinent relevance and this singular aspect of a person's entire environment. Dissonance, on the other hand refers to the cognitive realisation that a particular object's qualities are not matching with one's schemata and the negative affect emerging from the initial cognitive appraisal.

The state of being in environmental resonance, that is the presence of an underlying sense of affinity with one's physical surroundings is hypothesised to have a beneficial and restorative effect on the perceiver's mental and physiological health. Possible explanations for this effect are reduced stress with an associated calming influence on the individual's autonomic nervous system and endocrine system, relief from cognitive strain as no environmental threats have to be analysed and dealt with, general positive affect, and the provision of safety signals. Persisting environmental dissonance, on the other hand is thought to lead to psychological and physiological detrimental flow-on effects due to increased autonomic arousal, increased stress, cognitive strain, negative affect, and the presence of threat signals.

In order to arrive at the envisaged conceptualisation of the relationship between the individual and their environment a number of interrelated concepts such as mental templates, schemata, sensory fields, and a perceiver awareness continuum are required. Templates representing the individual's phylogenetically developed adaptational needs and those schemata referring to culturally given wants constitute one perceiver internal component of the individual-environment system and the theory of relevances describes the nature and function of these templates and extended schemata in the environmental appraisal process, respectively. Relevances, then, is the umbrella term for both types of mental structures.

On the other end of the individual-environment system it is necessary to specify content and qualities of the physical surroundings of the perceiver which are appraised by means of the aforementioned templates and schemata. The theory of the Environmental Sensory Field (ESF) as a further part of the proposed conceptual framework represents an effort to delineate the nature and characteristics of the various environmental components of perception such as objects, sounds and odours.

Finally, the encounter between relevances and environment is seen as taking place within and outside of the individual's awareness. Some objects, sounds, and odours will be consciously processed while others will not. An account of circumstances which lead to a particular environmental aspect's conscious registration by the individual, as well as an account of circumstances which do not, are constituting the theory of a perceiver internal Environmental Awareness Continuum (EAC).

Satisfaction or Frustration? — Resonance versus Dissonance

The use of the terms resonance and dissonance as descriptors of the state of an individual's relationship with their physical environment has arisen out of a remarkable congruence between research results, anecdotal stories, and the picture of reality which has emerged from post-classical physics. When exposed to media presentations or actual settings which have been conceptualised to represent pure wilderness (Kaplan & Talbot, 1983; Scherl, 1988 cited in Mausner, 1996) or at least naturalness (Kaplan et. al. 1972; Zube 1976; Nasar, 1987), participants often report an almost indescribable sense of "being in tune" with their environment (Frederickson & Anderson, 1999) which is similar to descriptions of "peak experiences" (Csikszentmihalyi, 1990). An experience of unity with nature (Mausner, 1996) which can have a highly spiritual quality (Stokols, 1990) and may contribute towards the development of an "ecological self" (Bragg, 1996) seems inevitably to originate from any close contact with an environment which is marked by the absence of artefacts of any kind. This kind of bond refers to a profoundly felt positive affective state which permeates the individual's whole existence as well as to a state of extreme cognitive clarity (Frederickson & Anderson, 1999). Directly complementary accounts of dissonance, that is "being out of tune" with their respective environment could not be located within the existing literature. However, results of research into individual's preferences for urban versus natural landscapes show that non-natural environments are universally being disliked by humans (Parsons, 1991). That is, preference ratings indicate a link between an experience of negative affect and exposure to non-natural environments.

Environmental resonance then refers to a profound affective affinity as well as to a cognitive congruence between the perceiver and the surrounding physical setting. The resonance-dissonance (RD) framework is based on the notion that human beings possess different layers of wants and needs (Alderfer, 1972; Maslow, 1970) which are directed towards their environment. That is, resonance or dissonance is thought to be the outcome of an appraisal process probing the environment's agency to fulfil one's needs and wants. Environmental resonance in its broadest terms, therefore refers to the fulfilment of adaptational and culturally given needs (Saegert & Winkel, 1990) while dissonance ensues when these expectations are not being met.

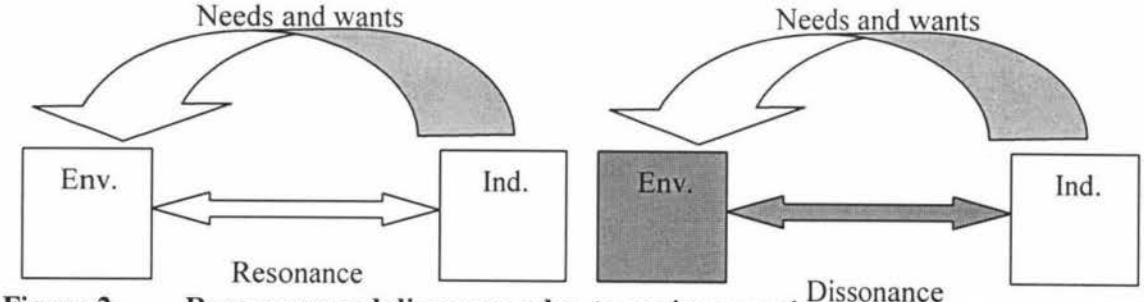

Figure 2: Resonance and dissonance due to environment's agency or non-agency to meet the individual's needs and wants.

It is postulated that there is a rather small number of universal adaptational needs and wants (Alderfer, 1972; Maslow, 1970) which have always been present during human phylogenesis. These needs are seen to be reflected by innate guiding principles of survival and self-preservation which remain largely independent from external influences. Adaptational needs such as the need for nourishment, safety, and the ability to manipulate objects introduce a teleological element into the process of perception as the goal of meeting these needs is inextricably linked to any encounter with one's physical surroundings. One function of perception, then, is to gather information in order to appraise the environment's agency to meet one's needs and wants. It is thought, that some of these needs are targeted not just at isolated particular aspects of one's environment but also to the entirety of one's physical surroundings. The individual's appraisal process in terms of the physical environment's agency to meet their adaptational needs is taking place

automatically and subconsciously and the outcome of this process is a rather global affective frame or background emotion (Clore, 1985; Lazarus, 1991; Damasio, 1999).

Affective resonance or dissonance

A small number of universal adaptational needs and wants (Alderfer, 1972; Maslow, 1970) have been developed during human phylogenesis. Resonance or dissonance refers to an underlying positive or negative mood providing the affective background against which more specific emotions and cognitions are playing out. As has been pointed out by Damasio (1999), various levels of affect are conceivable and not every affect is necessarily consciously experienced by the individual. While specific emotions such as happiness, sadness, fear, anger, surprise, disgust, embarrassment, guilt, and pride are regularly consciously experienced by an individual, there are also much more general and diffuse background emotions such as fatigue, energy, excitement, wellness, tension, relaxation, harmony, and discord. These background emotions are far less likely to be experienced consciously yet their presence is colouring one's life (Damasio, 1999).

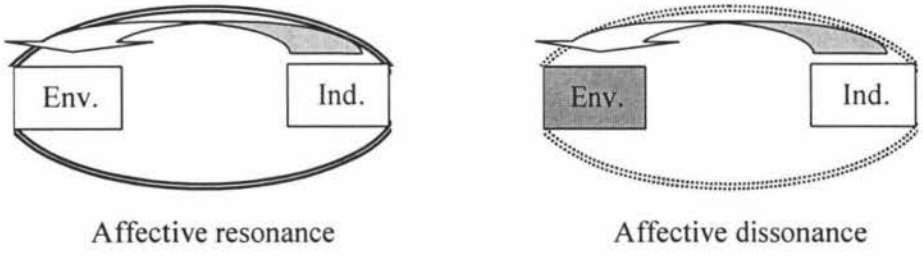

Figure 3: Underlying affective frame emerging from the environment's agency or non–agency to meet the perceiver's innate needs.

Thus, affective resonance can emerge in various intensities and can have an unspecified global character or a more specific and easier to verbalise nature. The variance along these parameters can be attributed to the relative importance and intensity of the respective underlying needs which may be directed either at the entire physical surroundings or at particular aspects thereof. Even on the level of basic adaptational needs such as nourishment, the ability to manipulate objects

(i.e. affordances), and general familiarity, it is possible to think of situations in which only some part of what can be seen, heard, smelled, and touched by the individual is relevant for the appraisal process. For instance, the colour of rock formations at the horizon and the fragrance of blossoms on a nearby tree would seem relatively irrelevant to a prehistoric individual who is hunting. The sounds, sights and odours of a passing herd of buffaloes and the primitive stone axe in the hunter's hand, however, are highly relevant in this situation. And the perception of potential food, as well as the means to acquire it, will most certainly lead to quite specific emotions (e.g. excitement, hope, joy, anticipation) linked to this individual's need for nourishment and ability to act. At the same time, the whole setting in which this hunter-prey-encounter is taking place (i.e. the sky, the vegetation, geological features, animals and so forth) consists of familiar elements. Because of this fundamental familiarity, it is thought that the individual's background emotion will be one of wellness, relaxation, and harmony. In other words, irrespective of the outcome of the encounter with specific elements of their environment, such as buffaloes and axes, which will lead to equally specific and strong positive or negative emotions a diffuse positive background mood will be present. While this prehistoric hunter experiences anticipation, excitement and so forth, he also has an underlying sense of affinity with his physical surroundings.

The functional value of affective states lies in their agency to carry information about the current state of the relationship between the individual and the environment (Schwarz & Clore, 1988). Feelings are heuristics for the individual's environmental appraisal process. This is because they arise in the context of achieved or thwarted goals. Environmental resonance as a global and diffuse positive background emotion of affinity, which is linked to the individual's physical surroundings, signals a certain congruency between the individual's adaptational needs and the environment's general agency to meet them. Environmental resonance as specific, and probably consciously experienced, emotion signals the agency of particular environmental elements to meet specific adaptational needs.

Environmental resonance, then, is thought to be constituted by a positive background affect and specific emotions linked to the environment as a whole or to particular aspects thereof. That is, environmental elements which have life-sustaining and pleasing characteristics are conducive to positive affect as the primary outcome of the individual's appraisal process in terms of adaptational needs. Environments, which do not possess these characteristics, or are dangerous and threatening, are expected to lead to negative general affect as well as specific emotions such as fear, dislike, disgust and so forth.

Affective resonance based on the environment's phylogenetic familiarity can best be described as a subtle feeling of belonging, intimacy, and affinity with the environment (Fredrickson & Anderson, 1999). On the other hand, if the environment does not match with the "familiarity templates" an underlying sense of alienation between the perceiver and their environment emerges. As has been pointed out by Zajonc (1980), even specific emotions are always difficult to verbalise. And the general diffuse background mood (Lazarus, 1991; Schwarz & Clore, 1988), which is not consciously experienced by the individual, represents certainly no exception!

Specific emotions are often tied to the presence of specific environmental elements such as particular objects, sounds, and odours. On the other hand, environmental affinity or alienation as the most fundamental forms of resonance and dissonance is conceptualised to represent a continuous relationship between the individual and their entire physical surroundings. That means, an individual is always either in a state of affinity or alienation with their environment and changes in the make up of their physical surroundings will lead to a corresponding modulation of this profound and ongoing relationship. In other words, it is impossible not to relate to one's environment in terms of familiarity and other adaptational needs. Environmental affinity or alienation is thought to usually remain outside of the perceiver's awareness while exerting its influence on other cognitive and affective processes.

As has been pointed out by theorists and researchers in many sub-fields of psychology, emotions, cognitions, physiological reactions and observable behaviour are closely interlinked facets of any individual's complete existence. The cognitive psychotherapy model (Beck 1976; Beck & Rush & Shaw & Emery, 1979) in particular acknowledges the link between all areas of human functioning in the form of the so called "five-part model". Here, these factors, as well as the situation in which the individual is embedded, are seen as nodes of a network-like structure. Any change in one of these nodes automatically leads to corresponding changes in the remaining parts.

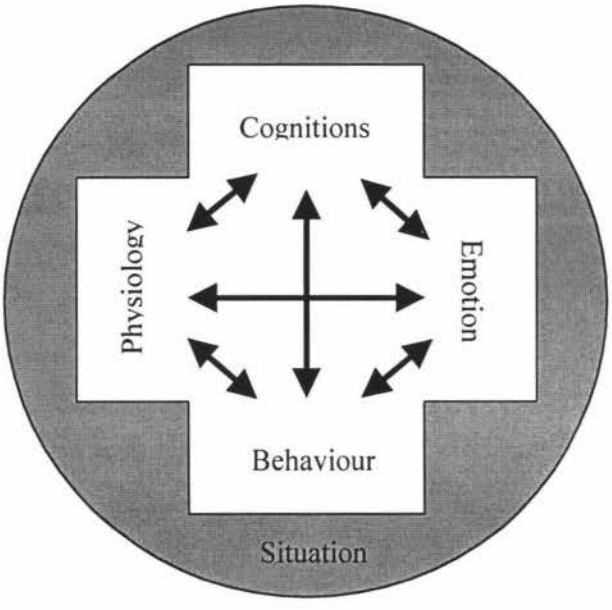

Figure 4: Traditional five-part model of human psycho-physiological functioning within particular situation.

In expanding on the original five-part model of cognitive therapy, which also maps onto many more approaches of psychological theorising, the proposed RD framework provides a conceptual link between the 5-part perceiver system and its current physical context.

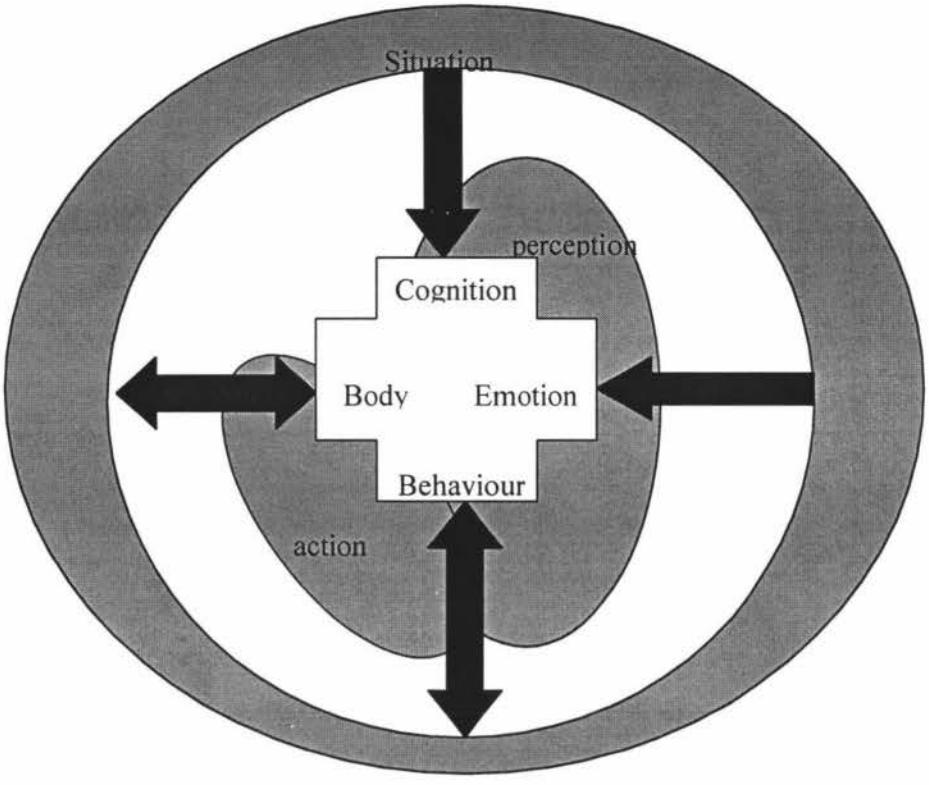

Figure 5: Modified five–part model of psycho–physiological functioning linked to situation through perception and action.

It is further assumed that the initial affective resonance or dissonance will spread to involve also cognition, physiology, specific emotions, and behaviour. In other words, affective resonance and dissonance tendencies are seen as having a directing and activating effect on other areas of the perceiver's psycho-physiological functioning. An environment with which one is in resonance is thought to lead to the emergence of a positive background emotion which in turn is linked to a strengthening of the individual's parasympathetic nervous system as well as to an increased probability of positive cognitions and corresponding behaviour.

Conversely, an environment with which one is in dissonance leads to general negative affect, which in turn will prime cognitive processes towards the detection and analysis of threat. Sympathetic activity might increase to prepare the body for some kind of action (Cannon, 1932; Selye, 1956; 1973; 1982) and corresponding behaviour (e.g. searching for a better place) will be observable.

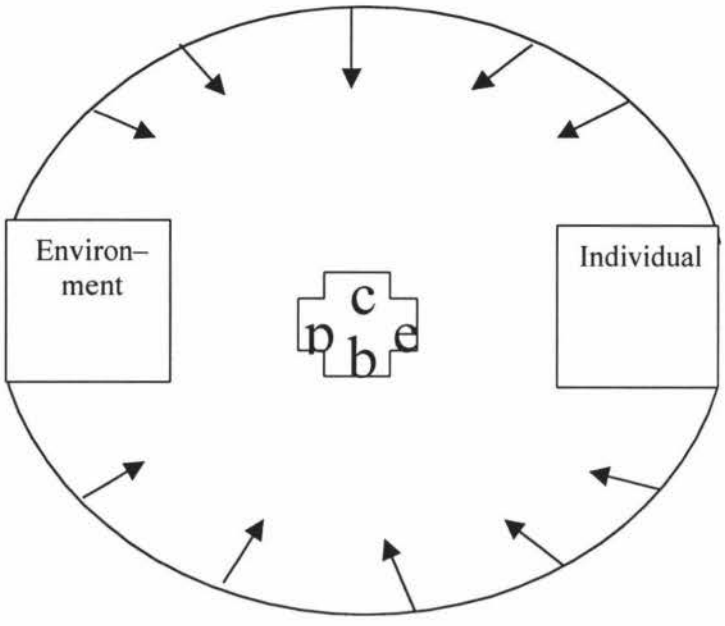

Figure 6: Affective frame directing and priming the individual's psycho–physiological functioning

Most environments, however, are likely to encompass a mix of elements which lead to the emergence of resonance and dissonance. That is, only rarely will an environment possess the agency to meet all of the individual's adaptational needs. There are a number of natural settings such as deserts, which are phylogenetically familiar yet lack the agency to nourish and sustain the individual. And in most contemporary settings phylogenetic familiarity in particular is not a given anymore as human-made artefacts dominate urban areas and are also present in most rural settings. Environmental affinity which requires the congruence between internal templates representing familiarity and the physical environment has thus become a rare state. Indeed, continuous environmental alienation of varying strength has become the norm.

The most immediate cognitive-behavioural effect of today's environments is that of directing the perceiver's attention to those environmental elements with which one "resonates or dissonates" the most. The function of positive affect is to create an pull towards benign elements of the environment (Kaplan, 1988; 1988a) while dissonance leads to a push effect away from malignant elements of one's physical surroundings. Single environmental elements, which are leading to the emergence of resonance, can be embedded in a context of aspects leading to dissonance, or

vice versa. Such isolated elements are more likely to lead to the emergence of specific and consciously experienced emotions than homogenous environments. For instance, a single tree which is conceptualised to represent a benign – because phylogenetically familiar – element in an otherwise artificial context such as an inner city urban street scene will elicit stronger specific positive emotions than a similar tree in the context of a forest. Conversely, a single soda can washed onto an otherwise pristine beach will lead to a stronger negative emotion than a similar can lying in a rubbish dump. In other words, even the match between adaptational needs and environmental elements, which normally leads to a merely subconscious background emotion, can lead to the emergence of a consciously experienced specific emotion if the element is extremely salient in terms of the adaptational need.

Consequently, affective environmental resonance or dissonance varies in strength and scope depending on the momentary context of the perceiver. Phylogenetically familiar environments are conducive to the emergence of a particularly broad and diffuse form of environmental resonance, namely a subtle sense of affinity. Nourishing and safe environments in general are also likely to lead to a positive underlying affective frame. However, it is possible to be in a phylogenetically familiar setting where the properties of particular elements still have the agency to elicit specific positive or negative emotions. These background moods and specific emotions are also influencing other domains of the perceiver's psycho-physiological functioning such as cognitions, behaviour, and physiological parameters.

Neurological evidence for the existence of an independent affective appraisal system has been provided by research. Joseph LeDoux (1996) has presented a neurological model of processing of sensory information which seems to provide a biological explanation for the notion of independent yet interlinked systems for the appraisal of one's environment in terms of its agency to meet one's expectations. According to LeDoux's findings, incoming sensory information is processed via two different pathways. The first pathway, which represents the neurological

correlate of cognitive resonance or dissonance, passes information through the thalamus and relays it to the sensory neocortex. There integration and associative processing of the information (i.e. matching with schemata) takes place before subcortical structures, such as the amygdala (LeDoux, 1996), or the hippocampus (Vinogradova, 1975; O'Keefe& Nadel, 1978; Gray, 1982 all cited in Parsons, 1991), become involved and produce emotional responses. Secondly, the same sensory information also seems to be relayed directly to the subcortical structures for a quick and early affective processing. Subcortical and cortical structures are connected, of course, so that the result of the respective processing will be conveyed to other parts of the brain.

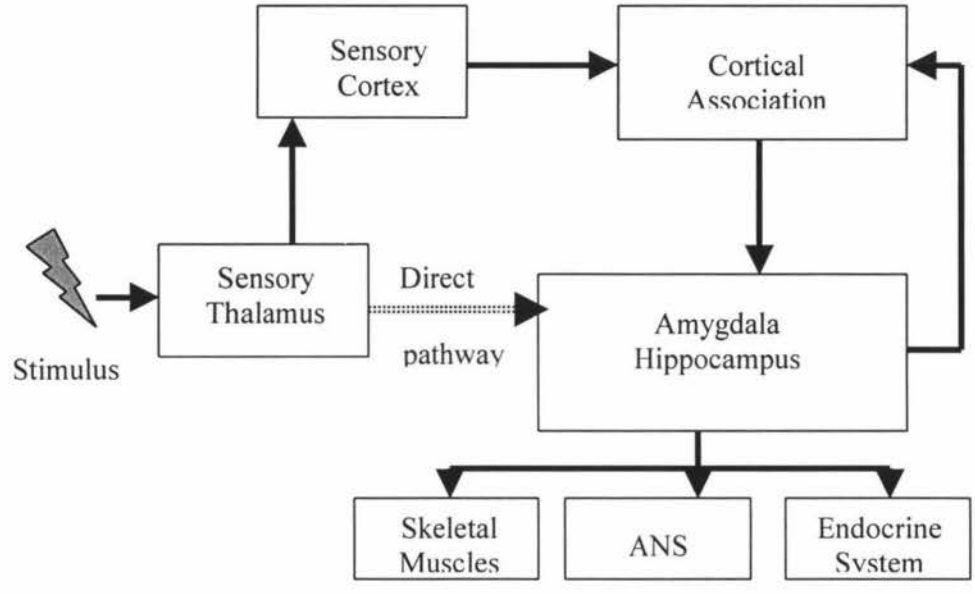

Figure 7: LeDoux's model of stimulus processing

Irrespective of the actual neurological structure involved, the direct subcortical processing of sensory information is presumed to be based on far more basic and immediate criteria such as 'the avoidance of noxious situations and approach to nurturant ones' directed at the environment than the neocortex based cognitive appraisal which refers to identification, communication, and social interrelationships (Ittelson, 1973). And the outcome of this phylogenetically older appraisal mechanism of survival-relevant expectations is thought to be positive (i.e. resonance) or negative (i.e. dissonance) affective tendencies and experiences.

A metaphorical attempt to explain the notion of environmental affective resonance and dissonance tendencies as the result of an active vibrating system rather than a passive mechanical information processing device might be to imagine the surface of a lake. Due to an extremely steady breeze, a regular pattern of wave activity can be observed. If one now imagines a little duckling paddling across the lake with the exact speed and trajectory of the wind generated waves, one would have an example of perfect resonance as the original wave pattern on the lake's surface remained undisturbed. If, however, the duckling decides to change direction or speed or both, the perfect wave pattern will be disturbed by the new waves originating from the duckling's activity. The degree of ensuing dissonance between the two different wave patterns will be determined by the force of the duckling and its deviation in terms of direction and speed from the wind generated pattern. If the wind-lake system was a conscious entity and if the wind generated wave pattern was its preferred state, the duckling's activity then would undoubtedly lead to a certain degree of watery affective dissonance.

Cognitive resonance or dissonance

The main thrust of the proposed RD framework is directed at developing a model which makes it possible to integrate findings from environmental psychology on people's preferences regarding their physical surroundings and on the restorative effect of natural environments with concepts from clinical psychology and health psychology. Consequently, the RD framework puts a strong emphasis on the underlying affective outcome of the individual's continuous and subconscious appraisal of their environment in terms of their adaptational needs. However, human beings certainly are not limited to subcortically determined affective responses to basic survival and procreation related needs, but carry an enormous wealth of neocortically-based cognitive processes as well. This needs to be acknowledged and integrated into any model of the perceiver-environment relationship.

While the ever-present basic adaptational needs do have a decisive influence on the individual's explicit or implicit goals in relation to their physical environment, most of their consciously experienced needs and wants are actually the result of a social learning process. That is, the individual learns from parents, peers, and the media what it is they need to have or need to be in order to fit in, to be happy, to be ethical, or to be successful. These broad schemata of being successful, popular, or just part of a group, are subject to a myriad of influences external to the perceiver and will therefore change more or less frequently over time. These schemata encompass ideas, beliefs, images, and general knowledge which serve the individual as a mental yardstick. They are directed towards particular environmental elements and processed primarily on a cognitive level. As the targeted environmental elements move into and out of one's perceptual range, the appraisal processes – linked to their presence – are inevitably of transient and temporary nature.

The notion that a mismatch between an individual's schemata (i.e. concepts and ideas about themselves and the world) and their context might lead to specific cognitive and behavioural reactions is not a new concept. The theory of cognitive dissonance was developed by Festinger as early as 1957. In his framework, inconsistencies between cognitive and behavioural patterns are thought to generate negative affect which in turn is seen as a motivational force to resolve the inconsistency, either in form of cognitive restructuring or behavioural responses. In the case of this particular theory, a matching process between the individual's cognitive schemata (i.e. attitudes) and their actual behavioural patterns is the postulated core process.

As far as the individual's culturally constructed needs and wants are concerned, the proposed RD framework of environmental perception is partly based on Festinger's (1957) seminal concept of an ongoing internal and mental matching process. In case of the RD framework, the matching process does encompass broad schemata, which are internal to the perceiver, and external environmental events. These schemata contain also reference patterns of attributes of objects, sounds, and

odours which are required if those environmental elements are to meet the perceiver's culturally given needs and wants while other schemata represents threats to these needs.

Cognitive resonance is conceptualised to be established when the perceiver's internal needs schemata match with the surrounding physical environment. An illustration of this process of successfully matching internal schemata with external events is the subjective experience of listening to one's favourite piece of music. Resonance occurs when the anticipated sequence of sounds reaches the perceiver's consciousness via his or her perceptual-cognitive system. That is, the perceiver has a number of images, memories, beliefs and knowledge around music in general and the particular song in question. Part of this particular schema is a more or less well-defined cognitive reference pattern of his or her current favourite piece of music based on previous exposure and transfer into long term memory (Atkinson & Shifrin, 1968; Bahrick, 1984 all cited in Matlin, 1998). When the particular sequence of sounds matches with the perceiver's schema it will be activated by this match. It is also possible that this schema was already activated and the perceiver deliberately sought out the music with the expectation of a match. Either way, at this moment of listening to one's favourite piece of music, no other sequence of sounds will do, if resonance is to ensue. Even small deviations from the anticipated sequence due to technical problems or because it is a feature version by a different artist might lead to a negative appraisal.

In other words, the content of the schema with which the environment matches is instrumental for the ensuing cognitive and affective response. Schemata about benign or pleasant events provide also behavioural goals as the their bearer will seek out or stay in situations which match with them. Again, as was the case with the innate templates representing adaptational needs, the culturally given schema-based environmental appraisal process is a teleological one. The individuals strive to maximise congruence between these positive schemata and their environment. That is, these schemata represent certain positive expectations which are directed at the environment.

Cognitive resonance, then, does refer to the perceiver's conscious or subconscious realisation that their specific expectations directed at particular aspects of their environment are actually being met. That is, positive images and thoughts might emerge in relation to the particular environmental element. In case of becoming aware that one's favourite music is being played, thoughts like "oh great, my favourite song", emerging images of the artist's latest video, or memories of a previous romantic encounter in the presence of this song, might be examples of conscious cognitive resonance.

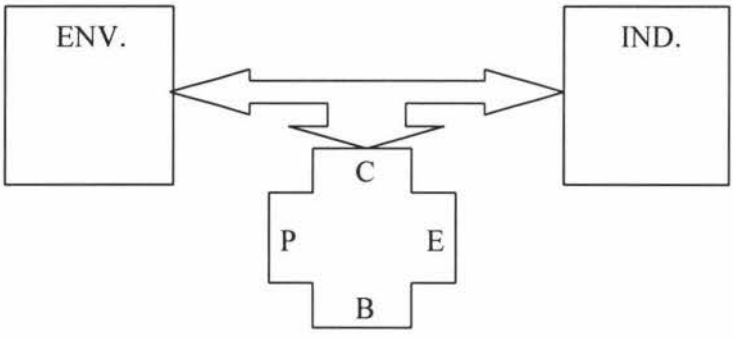

Figure 8: Cognitive resonance due to environment's agency to meet culturally shaped wants and link to psycho–physiological functioning

Again, as has been outlined under the rubric of affective resonance and dissonance, this cognitive resonance emerging from the moment-to-moment process of recognising the match between schema and auditory input can be expected to spread rapidly to other areas of the perceiver's psychophysical functions. That is, positive specific emotions of joy and happiness, physiological changes in terms of heart rate and blood pressure, and corresponding behaviour such as dancing and singing along will occur as psycho-physiological sequelae to the initial cognitive resonance.

Framed in common terms of environmental psychology, that is the encounter between an individual and their physical surroundings, another illustration of this spreading process could be the inspection of a piece of land by a developer. At the boundary of the paddocks ahead is a sign signalling the imminent development of the area by the perceiver's company. The discernible sign announcing the development therefore is matching a cognitive schemata around prospective

profits, her negotiation skills, images of heavy earth moving equipment which will transform the paddocks into sellable housing sections, and so forth. The cognitive realisation of the congruence between the sign and the developer's pertinent schema will quickly lead to subsequent positive emotions of pride and satisfaction and general happiness. This in turn can lead to immediate behavioural responses such as smiling, pumping fist into the air, or to long-term responses such as working even harder on the next project. Corresponding physiological effects on heart rate, blood pressure, and hormone secretion will also take place (Kalat, 1995). In other words, the initial cognitive resonance experience of realising the congruency between her positive schemata relating to the piece of land in front of her and the current perceptual information about this site will spread to encompass affect, behaviour and physiology.

As has become clear, this process of initial cognitive resonance and subsequent positive affect is linked to the presence of particular environmental elements. That is, at the very moment the land developer turns around and walks to her car, other elements such as her car, or the busy road ahead, come into play as the building site disappears out of her visual field. While the cognitive, affective, physiological, and behavioural sequelae from the preceding encounter with the building site can be expected to linger on, the duration of the resonance experience is limited as a new set of active schemata will be applied to a new set of environmental elements now being accessed by her sensory apparatus. And resonance can quickly turn into dissonance if the car does not start or if no one lets her join the traffic!

Cognitive dissonance is the opposite of resonance in that it arises either out of a mismatch between positive schemata representing culturally given needs and wants and the external environment or out of a match between negative schemata and the environment. That is, in case of dissonance, the individual's expectations of benignity and pleasantness directed at the environment are frustrated by those events actually occurring and cognitive dissonance is the realisation of one's expectations being thwarted.

If, for example, someone dearly wants to possess and drive an expensive Italian sportscar, cognitive dissonance is expected to arise out of this person's encounter with their own cheap, old, and slow Japanese import. The overall shape, colour, the badge, and the black license plate just don't match with the owner's active schemata around the attributes of a typical Italian sportscar and what it means to own such a prestigious vehicle. This schema might include ideas and beliefs about impressed friends and beautiful members of the opposite sex begging for a ride, or notions of being successful, and so forth. Negative thoughts such as "I want a new car", "look at this rust bucket", "I'll never drive a decent car", and images of other people making fun of the individual or looking down their noses on him because of his car, are expressions of cognitive dissonance arising out of the mismatch between his pertinent schema and his current means of transport.

Cognitive dissonance can also arise out of a match between negative schemata with malignant and displeasing content and the environment. For example, an individual might hold schemata concerning music she really dislikes, which include auditory as well as visual reference patterns. A particular singer's appearance on TV might match with these schemata thus leading to corresponding thoughts such as " Oh no – not country music!". Images of people who like this kind of music and whom she does not admire might emerge. Again, as has already been outlined, a spreading effect will influence affect (e.g. annoyance), physiology (e.g. elevated galvanic skin response) and behaviour (e.g. eye rolling, walking away, switching channel) correspondingly.

It is presumed that any individual will be holding more than one narrow set of cognitive schemata about their environment. As in the example of the car enthusiast, some of these schemata might be closely related to each other (e.g. prestigiousness of particular marque and popularity of its drivers) while others might be comparatively unrelated (e.g. prestigiousness of particular marque and protection from rain while commuting). It is therefore entirely possible that the same environmental element (e.g. car) could lead to different and even contradicting concurrent tendencies of cognitive resonance and dissonance.

Driving to work in rain, the owner of the vehicle might experience cognitive dissonance because of the general mismatch between his "prestigiousness schema" and the vehicle he is driving. Yet, there is also an element of resonance between his utility schema which includes the idea that a car is a good way to move around in rain while staying dry and the car's perfect match with this particular schema. That is, the same object resonates with one schema but is in dissonance with another. Thus, contradicting tendencies of cognitive resonance and dissonance as well as affective, physiological and behavioural sequelae can coexist.

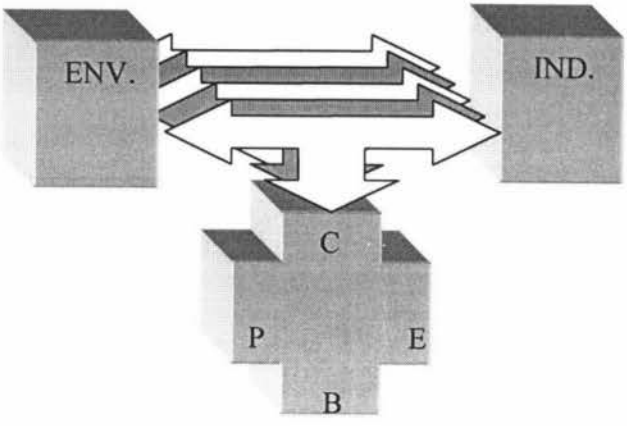

Figure 9: Multiple, contradicting cognitive resonance and dissonance tendencies impacting on individual's psycho–physiological functioning

An important conceptual distinction is that between cognitive resonance or dissonance based on current perceptions and those based on non-perceptual processes. It is assumed, that the proposed perceptual appraisal processes slot into a greater network of cognitive processes such as memory, planning, language, and so forth. Incoming information about the present physical environment, of course, is not the sole source of cognitive-affective processes in the perceiver. The entire cognitive continuum of an individual encompasses many more processes, functions, and types of information and schemata than just the "input" from their sensory organs (Matlin, 1998).

While Festinger's (1957) original concept of cognitive dissonance was still based on immediate perceptual processes (i.e. one's observation of one's own behaviour in relation to one's own attitudes) other resonance or dissonance experiences can be

based on non-perceptual processes. The profound existential dissonance experienced when contemplating one's own mortality is based on the incongruency between a schema encompassing ideas, and beliefs around wanting to live forever and the certainty that this schema will not be matched by reality at some point in the future. There are also schemata around spiritual, religious, and ethical issues which are not necessarily linked to perception at all. Cognitive resonance or dissonance experiences, therefore can originate from sources other than the perceiver's immediate contact with their environment. Even the experience of cognitive-affective resonance that might ensue when waking up in the morning (eyes still closed) and remembering last night's romantic events is – at the very moment it is taking place – purely based on memory rather than current perceptual input. These memories are based on previous perceptual input, of course. Hence, resonance and dissonance can emerge from the individual's contact with his or her current physical surroundings. They can also emerge from other processes, which can be based on previous sensory input, or other non-perceptual sources. As far as the latter is the case, they do not pertain to the proposed model of an appraisal process linking the individual to his or her current and immediate physical surroundings.

The proposed RD framework, as a step towards integrating a wide variety of phenomena from the fields of environmental, clinical, and social psychology is targeted at the immediate affective and cognitive repercussions of the perceiver's contact with their current, perceptually accessible physical environment. While other cognitive processes, such as memory, planning, affect, language, problem solving, and so forth, have an influence on the proposed concept of the individual-environment encounter, they are not the focus. As has been hinted at already, the RD framework is expected to be able to integrate non-perceptually based psychological phenomena as well. Yet, this endeavour lies beyond the scope of this thesis.

The environmental resonance and dissonance phenomenon as conceived in this framework cannot be attributed solely to structures or processes, which are

internal to the perceiver. Nor is it a direct function of external environmental events alone, as in behaviourist notions of a linear stimulus–response relationship (Skinner, 1974; Watson, 1913). Resonance and dissonance emerge out of the direct interaction between individuals and their environment. On the other hand, it is also possible that surrounding objects, sounds, odours, and so forth are simply irrelevant to the perceiver in terms of socially constructed schemata. Such aspects of the environment are thought to be more or less neutral in terms of their agency to elicit a cognitive resonance or dissonance experience. Thus, the individual will be fairly indifferent to such specific environmental elements.

Environmental affective and cognitive resonance or dissonance is a relationship characteristic which emerges out of the interaction of two interlinked aspects of reality, namely perceiver and environment. While it is possible, to describe and measure psychological, physiological, behavioural and neurological correlates of resonance or dissonance it is not possible to conceive of it as a discrete unit of matter which exists on its own. It is thought to be a phenomenon analogous to the flow of electricity produced by induction when a metal coil and a magnet are positioned correctly and moved relative to each other. In other words, resonance and dissonance emerges only if and when the circumstances are right. That is, perceiver-internal needs and wants (i.e. templates and schemata) and external environmental elements (i.e. objects, odours, sounds) need to meet. Without these circumstances resonance or dissonance simply does not exist.

Cognitive resonance and dissonance tendencies are temporary phenomena which emerge only if and when socially shaped schemata meet with specific environmental elements. Meanwhile, affective resonance and dissonance are continuously present as the circumstances which give rise to them are always in place for as long as an individual is alive. That means, that at any given moment a myriad of distinct cognitive and affective resonance and dissonance tendencies emerge out of the contact between the individual and their environment.

An important building block of the proposed rd framework is the notion that most cognitive and affective processes take place outside of the individual's awareness (Bargh & Chartrand, 1999; Lazarus, 1991). That means, that not every match or mismatch of a perceiver's templates and schemata with their environment does lead to a conscious experience of resonance or dissonance. Which one of these resonance versus dissonance tendencies actually enter into the individual's awareness depends on a variety of factors such as the relative strength of the competing schemata and the degree to which the environment matches or does not match with them.

Individual differences in terms of the nature and strength of affective and cognitive resonance or dissonance tendencies in the face of similar environmental conditions are to be expected. Developmental maturation processes have a moderating effect on the individual's environmental appraisal in terms of adaptational needs. For children it might be far more adaptive to be curious and engage in explorative behaviour than might be the case for individuals who have reached their late adulthood. Phylogenetic non-familiarity of the environment thus is more likely to be associated with excitement and playfulness in younger individuals while the same setting might lead to the emergence of disquiet and caution in older persons. Secondly, temperamental differences play a role in the proposed appraisal process, as people high in traits such as sensation-seeking (Zuckerman, 1971; 1979; Zuckerman, Buchsbaum & Murphy, 1980; Zuckerman & Ulrich & McLaughlin, 1993) will be more likely to experience positive affect in unfamiliar or downright dangerous situations. The sociocultural context in which the individuals form their cognitive schemata, as well as the current situation, have a bearing on which schemata are activated and what the outcome of the cognitive appraisal process will be.

As a result, the term resonance, as used in the context of the proposed model, refers to the outcome of an appraisal process in which the individual perceives the environment's agency to meet their adaptational or culturally given needs and wants. On the level of adaptational needs, a match between the environment and

innate templates representing those needs leads to the emergence of an underlying positive affective frame. Cognitive resonance, on the other hand, is constituted by the perceiver's conscious or subconscious realisation that their culturally constructed positive schemata are matched by the environment.

Dissonance on the level of adaptational needs, refers to an underlying negative affective frame stemming from the mismatch between the environment and innate templates representing those needs. Any match between such templates representing threats to these needs and the environment are also conducive to the emergence of dissonance. Similarly, cognitive dissonance emerges when the environment is appraised to lack the agency to meet culturally given needs as represented in schemata or if negative schemata and the environment match.

Furthermore, it is proposed that complimentary as well as conflicting affective or cognitive resonance and dissonance tendencies can arise concurrently out of the perceiver's perceptual contact with the environment. While the individual's underlying affective frame is continuously present and merely modulated by changes in the environment, cognitive resonance or dissonance is a much more temporary and sequential phenomenon because it is tied to specific environmental elements which move in and out of the individual's perceptual field. Again, while it is impossible for the individual not to relate to their environment in terms of their innate adapational needs, it is possible to remain indifferent to particular objects, sounds and odours in terms of culturally given schemata.

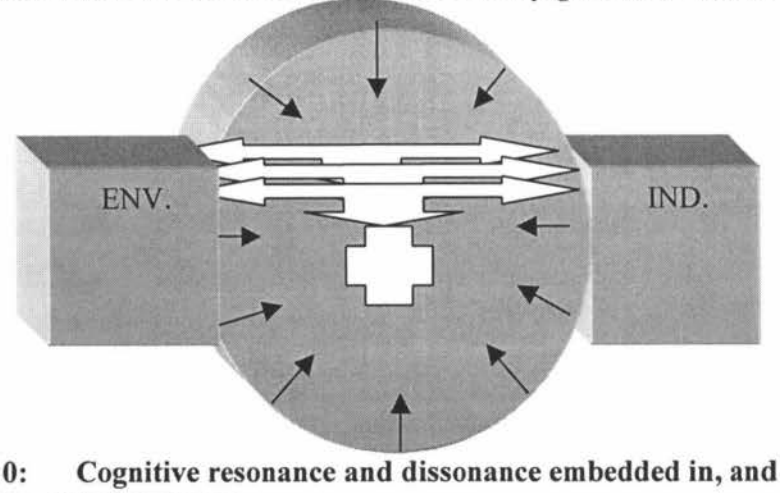

Figure 10: Cognitive resonance and dissonance embedded in, and influenced by, underlying affective frame.

Furthermore, it is assumed that the affective and cognitive appraisal mechanisms represent neurologically and functionally separate systems, which are interlinked and interactive (LeDoux, 1996). The use of the terms resonance and dissonance therefore can either refer to cognitive processes, which are seen to take place in cortical structures, or to much more global affective states, which have been associated with subcortical brainstructures. In the context of the proposed theoretical framework, affective resonance and dissonance are synonymous terms for environmental affiliation and alienation, respectively.

Environmental affective or cognitive resonance and dissonance are the result of appraisal processes by the individual. It is now time to take a closer look at the circumstances which allow these affective and cognitive tendencies to emerge. The next chapter will outline the characteristics and the origins of perceiver-internal structures, such as templates and schemata, which provide the individual with a mental yardstick necessary to carry out this important appraisal process.

What is important to us? — Theory of Relevances

Now that the nature of the proposed environmental resonance and dissonance phenomenon and its position within the interplay of cognitions, affect, physiology, and behaviour have been outlined, it will be necessary to take a closer look at the components which together allow this phenomenon to emerge. The first step in this process of describing the circumstances which must come together in order to create resonance or dissonance will be investigating and defining the perceiver's internal structures. These structures enable him or her to make a judgement as to whether particular objects, sounds, odours and so forth are relevant in terms of his or her needs and wants as well as in terms of their benignity or malignancy. This is not to imply that these structures posses any kind of superior or primacy status in the emergence of resonance–dissonance; it has been made clear all components must be in place. But one has to start somewhere in trying to delineate the components of this individual–environment system and the decision where to start is entirely arbitrary!

Relevances in general

The umbrella term for the structures involved in environmental appraisal is that of a relevance. Relevances vary in correspondence with the level of appraisal. On the level of fundamental adaptational needs, they exist in the form of innate, broad, and inflexible templates. On the level of culturally given needs and wants, on the other hand, relevances are conceptualised as flexible and learned cognitive schemata encompassing ideas, factual knowledge, beliefs, and images.

Templates and schemata are concepts developed and refined within cognitive, clinical, and social psychology. Schemata, in general, represent knowledge and ways of thinking about aspects of self, others and the world which leads to observable and measurable behaviour (Beck, 1976; Franzoi, 1996; Thorndyke, 1984). Templates have been defined as reference patterns to which incoming sensory information can be compared (Matlin, 1998). The proposed RD framework thus utilises concepts developed by cognitive psychology which has filled behaviourism's black box of the mind with thought processes and content in order to explain an individual's response to external stimuli.

Since the RD framework at this stage is targeted at environmental perception and appraisal, it will be most fruitful to investigate those templates and schemata which are used by the perceiver to make sense of their current physical surroundings. It is important to note that in this context the term "use" does not imply the conscious and volitional application of some sort of a mental tool but rather the automatic activation and functioning of particular mental structures. The fundamental underlying process of recognising objects, odours, sounds and tactile sensations and forming a mental representation of them (Coren &Ward & Enns, 1994) is not the object of theorising in the proposed framework. The perceiver's ability to see, smell, feel, hear and taste their environment is taken as a given. How the actual initial physical impact of pressure, airwaves, light and molecules on receptor cells is being transformed by the sensory-perceptual system into a representation of their environment (i.e. surfaces, sounds, objects, and odours) will not be discussed and does not seem to be crucial for the proposed theoretical framework. In the context of the RD framework objects, odours, sounds and surfaces are regarded as a fact of life and as the basic environmental elements with which the perceiver interacts.

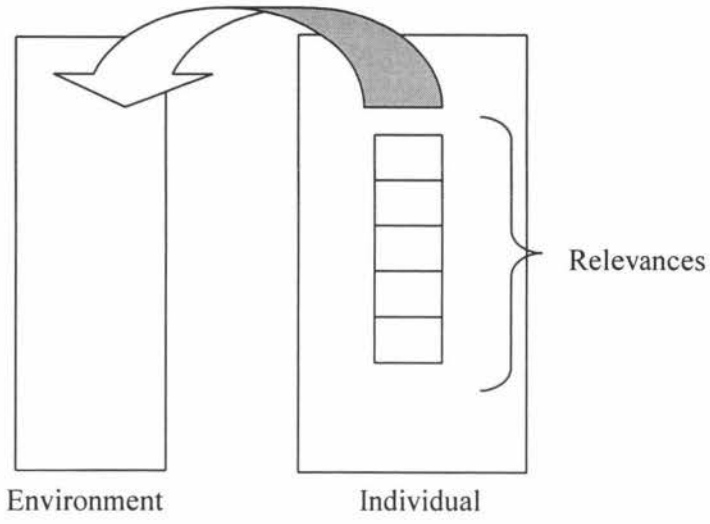

Figure 11: Perceiver internal relevances representing needs and wants directed at the environment.

The relevances, proposed here in order to explain the perceiver's relationship with their physical surroundings, refer to certain types of meaning which are attached to these environmental elements and not to the processes necessary to categorise, identify, and recognise them. The term meaning in this context refers to the degree to which the environment is benign or malignant to the individual. In assuming an evolutionary standpoint (Barkow, Cosmides & Tooby, 1992), self-preservation, procreation and the fulfilment of needs in general are seen as underlying adaptive principles of the process of appraising one's environment. As has been outlined earlier, environmental conditions which allow humans to meet their adaptational or culturally given needs,(i.e. conditions which sustain, nourish, satisfy, and please them), are expected to lead to affective and cognitive resonance while conditions which frustrate and endanger them will lead to dissonance.

At this stage, the proposed RD framework does not include resonance and dissonance tendencies emerging from non-perceptual processes. That means schemata are not the object of theorising as far as they are not linked to current sensory information. For example, experiencing positive affect and engaging in corresponding cognition due to remembering yesterday's romantic encounter or imagining tomorrow's date is not linked to actual current sensory information. In this situation, past or future events are being appraised, not the present environment. While the same principles might apply to this process, it is seen as positioned outside the conceptual boundaries of the proposed theoretical

framework. For the same reason, dreams are also not included despite the fact that they can assume a pseudo-perceptual and life-like quality, which sometimes leads to quite strong and lingering affective experiences similar to those based on actual sensory information.

To appraise one's current physical environment, a multitude of relevances are available to the perceiver. Positive relevances are those which represent expectations of benignity on the environment. Negative relevances are geared towards malignant aspects of the environment which threaten the perceiver's well-being and fulfilment of needs.

Two types of relevance

Two different types of relevances are proposed to provide the basis of an individual's appraisal of his environment. The crucial difference between these types of mental structures is the kind of knowledge about the environment they represent. Knowledge often is conceptualised as "having facts at hand". That is, conscious access to learned items of information is seen as the hallmark of knowledge. On the level of culturally given needs and wants relevances are indeed representing learned cognitive schemata about the world encompassing ideas, factual knowledge, and images.

However, psychological research has defied this common sense understanding of knowledge as the presence and application of information outside of the individual's awareness has been experimentally proven. Newborns' attention responses to faces (Kaplan & Sadock, 1998) or the balking of 6 months old babies when confronted with a visual cliff (Gibson & Walk, 1960) as well as the ease with which fear is aroused in response to certain stimuli such as snakes and spiders (Öhmann, 1979), are examples of research findings pointing to the existence of implicit knowledge that is guiding behavioural patterns.

These empirical findings make it possible to propose a type of relevance which is based on implicit knowledge. The term implicit knowledge refers to knowledge

which is accessed and processed outside of the individual's awareness and which has not necessarily been acquired by the individual himself but has been present a priori to ontogenetic experience and learning processes. This kind of phylogenetically acquired knowledge (i.e. evolutionary memory) is assumed to be "hardwired" into the brain structures of a member of a particular species (Mineka, 1992). This knowledge's availability may be dependent on maturing processes but not on the acquisition of new information.

Innate relevances

The particular type of relevances which are based on phylogenetic or implicit knowledge will be called innate relevances. Innate relevances are conceived to represent reference patterns with which the respective environment's benignity or malignancy in terms of its possible direct impact on the perceiver's body can be appraised. As this appraisal process is a completely automatic and subconscious one, innate relevances actually refer to the degree to which the environment has previously impacted on the perceiver's ancestors! In other words, innate relevances are seen as the result of an evolutionary process. Only a limited number of them suffice to encapsulate any environmental element's fundamental relationship with the perceiver in terms of its possible benign or malignant physical impact.

At this point any statement about the specific content of innate relevances, beyond Zajonc's assertion that they are encompassing gross and rather vague features (Zajonc, 1980) still has to be tentative. However, a number of possible innate relevances can be proposed. These innate relevances are: dangerousness, phylogenetic familiarity, nourishingness, affordance, pleasantness, prospect and refuge, and mystery and legibility. These innate relevances are conceived to be of universal nature. That is, they refer to phylogenetically determined reference patterns about the environment held by anyone.

Dangerousness refers to the environment's potential to harm the perceiver's body in case of a direct contact.

Phylogenetic Familiarity refers to the degree to which the environment is made up of discernible patterns which are similar to those patterns encountered by the perceiver's ancestors.

Nourishingness refers to the environment's agency to provide nutrients and water to sustain the perceiver's body. Orians' savannah theory (1980; 1986) holds that particular types of vegetation and geomorphological formations, which have been encountered by our early ancestors in Africa, inherently signal that food and water is available.

Affordance refers to the concept of the environment's agency to afford manipulation and use by the perceiver's body (Gibson, 1986). That is, a set of functional possibilities such as being able to sit, stand, walk, grasp and so forth relates the perceiver's body to the environment.

Pleasantness refers to the degree to which the environment's impact on the perceiver's body will be soothing, pleasing, joy inducing, and so forth.

Beyond these object, sound, and odour based relevances another set of "spatial templates", referring to patterns of distribution of objects within the perceiver's visual field has emerged from research in the area of landscape preference. The opportunity of seeing (i.e. **prospect**) without being seen (i.e. **refuge**) has been suggested by Appleton (1988) as a crucial environmental characteristic. Meanwhile, Kaplan and Kaplan (1989) assert that an environment's agency to provide involvement (i.e. **mystery**) and understanding (i.e. **legibility**) are pivotal for a perceiver's preference judgements. That is, certain spatial constellations of environmental elements are thought to be preferred without that this preference had to be learned first. Implicitly, humans seem to know which environments provide them with optimal opportunities to explore, get involved and understand what is happening. Thus Appleton's prospect-refuge concept as well as the Kaplans' mystery-legibility model are integrated into the RD framework as innate relevances pertaining to spatial patterns of objects rather than to characteristics of those objects themselves.

A hallmark of the concept of innate relevances – and phylogenetic familiarity in particular – is the notion, that these templates represent part of a continuous affective appraisal process of the perceiver's entire environment. In other words, it is impossible not to appraise one's environment in terms of its phylogenetic familiarity, dangerousness, nourishingness, affordances, pleasantness, prospect and refuge, and mystery and legibility. These templates, therefore, define an individual's ongoing fundamental relationship with their physical surroundings.

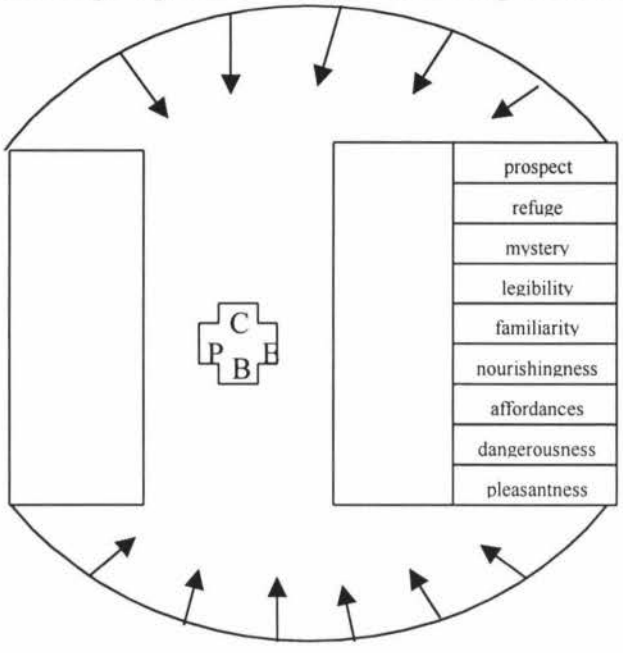

Figure 12: Underlying affective frame based on innate relevances

The individual's environmental appraisal process based on innate relevances starts at the moment of birth (maybe even earlier) and ends only at the moment of death and may only be suspended during episodes of profound unconsciousness in the time between. As has been outlined in the previous chapter, it is assumed that the initial outcome of the environmental appraisal process based on innate relevances will be an underlying affective resonance or dissonance tendency, which in turn, has a certain directing and activating influence on other psycho-physiological functions such as behaviour, cognitions and specific emotions.

While all of these innate relevances combined are proposed to define an individual's fundamental relationship with their environment in terms of their adaptational needs, the main thrust of the proposed RD framework – at this stage

of its development – lies mainly on the phylogenetic familiarity and dangerousness relevances. The explanatory and integrative power of the RD framework in terms of findings from environmental and clinical psychology rests mainly on the proposed influence of these innate relevances on the affective state of the perceiver.

Cultural relevances

Aside from the relatively small number of innate relevances relating the individual to her environment in terms of her adaptational needs there is also a vast array of schemata available to the perceiver (Amedeo & York, 1990). These schemata as the second type of relevance are the product of ontogenetic learning processes. The usefulness, desirability, prestigiousness, beauty, and many more attributes which can be attached to particular objects, odours, sounds etc., is not something necessarily inherent to these elements of the surrounding physical environment. This kind of quality ascribed to particular environmental elements is often immaterial and not based on the effect of an actual physical contact between an individual and the element.

These schemata have come into existence and been shaped largely by societal forces. For example, a car's prestigiousness and desirability is not inherent to the actual physical conglomerate of steel, plastic and rubber as such but depends on people creating a particular kind of meaning attached to this object. In many cases, such a meaning can depend on minute details of the object (e.g. badge displaying brand name, model, and engine specification) instead of the object as a whole. Advertising and marketing companies represent a whole industry in pursuit of deliberately creating and strengthening particular schemata of "hippness", "in fashion-beingness", "cleanness", success, security and so forth and linking these schemata to particular objects (e.g. clothes, cars, detergents, burglar alarms).

Individuals form and reform these schemata as they acquire information via the media, their parents and peers as well as from other formal or informal sources. These schemata are therefore rather abstract, malleable and transitory. In other

words, they are in many respects a social phenomenon as much as a personal one. The cultural context of the perceiver has a major influence of the formation and change process in regard of these schemata. What has been fashionable and desirable last year might not arouse one's interest this year at all and the meaning of objects, before judged to be of a "must-have" character, can have changed to being completely uninteresting. Sometimes the change in these schemata is proceeding at a slower pace. For instance, female beauty, which is such a schema, has undergone considerable changes from the Renaissance era to the 21st century as is documented in representations of women then and now. Today's popular and extremely slim super models would not have been looked upon favourably in the 17th century.

In respect to environmental perception, it is important to note, that the proposed schemata represent culturally given needs and wants. Currently present objects, odours, and sounds are related to oneself via those schemata, which are either activated by the sensory contact between the perceiver and their environment, or have already been active before this contact has been made. In other words, whether or not a particular object, smell or sound is perceived as being relevant to the perceiver, at any given moment, will be appraised by using these schemata as a point of reference. They determine how the perceiver is going to relate to their environment in terms of their culturally given needs and wants. For this reason these schemata will be called cultural relevances.

Cultural relevances, as the products of an ontogenetic learning process, are flexible because they are constantly reconstructed by societal forces and therefore subjected to an ongoing process of being reviewed by the individual. The acquisition of new knowledge and skills can hereby change existing relevances considerably. For example, the usefulness relevance as applied to a car depends – among other factors – on the perceiver's age and driving skills. For young children a different form of resonance or dissonance will emerge between their usefulness relevance and the family car as such. This because, their usefulness relevance does not yet comprises ideas, images and beliefs about transport other

than walking or "being taken by someone else". Of course, the car could still be useful in terms of providing a place to hide, stand on top, or play. However, as the perceiver grows older, acquiring a driver's licence in the process, his usefulness relevance will change as vehicles become an additional transport option. While young children's usefulness relevance (in terms of transport) does not match or mismatch with vehicles in themselves, that of someone holding a driver licence does. That means, that a car represents a comparatively neutral environmental element in terms of its usefulness or desirability relevance for younger children. Yet, the very same vehicle can become a very desirable and useful object for adolescents and adults holding a driver's licence.

In borrowing a concept from organisational psychology, the perceiver's SKAs, (i.e. their skills, knowledge and abilities) (Riggio, 1996) have a direct impact on the formation and change of abstract relevances. As these factors increase due to biological maturing processes or learning, new relationships with the environment can potentially be formed by the perceiver, thus creating new relevances or strengthening, or weakening existing ones. Sexual attractiveness is an illustration of a relevance, which will emerge and strengthen as the perceiver matures. Before this maturing process starts this particular relevance will not be present in the perceiver as has been postulated by the developmental concept of latency in psychodynamic theorising (Kaplan & Sadock, 1998).

Cultural relevances, therefore, provide the perceiver with an idiosyncratic, though because of their societal origin somewhat predictable, cognitive yardstick with which particular objects, sounds and odours are appraised in terms of their agency to meet culturally given needs and wants. If objects, odours, and sounds match these positive schemata, the perceiver experiences cognitive resonance and corresponding psycho-physiological sequelae. If they do not match, cognitive dissonance will emerge.

At the same time negative cultural schemata of dangerous, ugly, unpleasant, and undesirable events, situations, objects, and threats to one's needs and wants are

also part of the individual's complete set of cognitive structures. If the environment matches with these schemata cognitive dissonance, that is the realisation that one's culturally moulded needs and wants are being threatened or thwarted will emerge. Therefore, not only the mismatch between environment and a positive schema but also the environment's match with a negative schema leads to the emergence of dissonance.

Cultural relevances as cognitive schemata are thought to be organised in a network-like fashion. That is, they will be activated by other relevances and in turn will activate other relevances. And their relative strength within this network in terms of influencing the perceiver's cognitive and affective relationship with environmental elements is conceptualised as being attributable to a number of interrelated variables such as cultural context, skills, knowledge, abilities, personal experiences, age, perceptual capabilities, genetic makeup, biological maturing processes and learning capabilities. All these factors have a bearing on the schemata (Beck, 1976) the individual develops about themselves, others, and the world in general

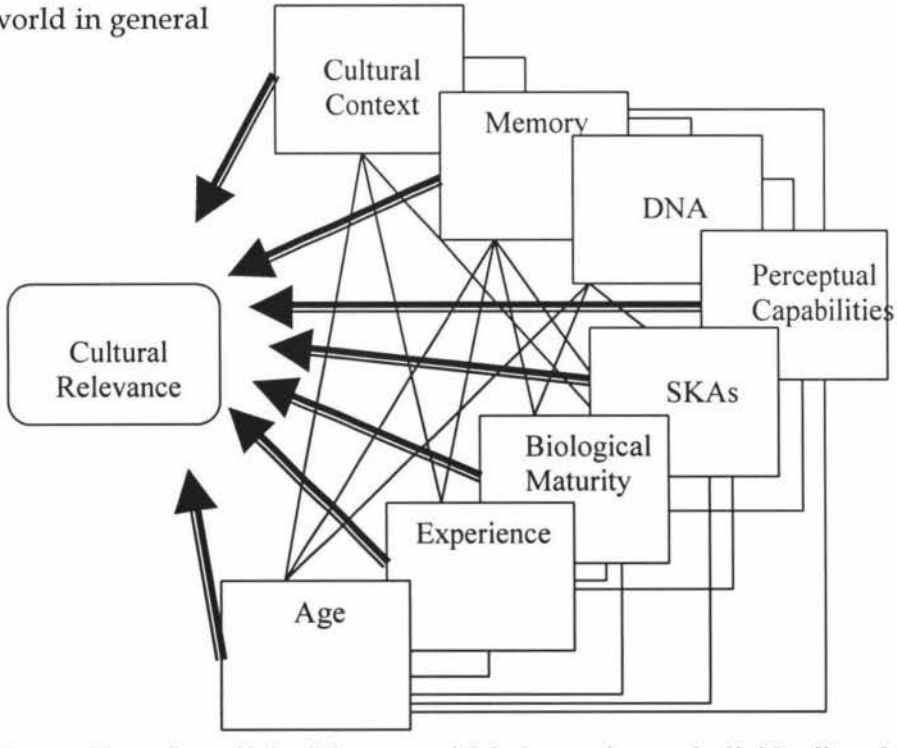

Figure 13: Interlinked factors, which determine an individual's cultural relevances

Personality traits such as sensation seeking (Zuckerman, 1971; 1979), trait anxiety (Spielberger, 1985), need for individuation (Maslach, Santee & Wade, 1987), and self-monitoring (Snyder, 1987) play an important role in the process of activating cultural relevances in correspondence to the situational context of a person. Anxious individuals, for instance, are known to have a cognitive bias towards detecting and attending to threatening elements (Mogg & Bradley, 1998). Cultural relevances of dangerousness, unpleasantness, hurtfulness, obnoxiousness and so forth will exert a greater influence on such an individual's appraisal of a particular element than competing positive schemata.

Again, in individuals with a strong desire to manage the impression they make on others (Baumeister & Hutton, 1987 cited in Franzoi, 1996), the presence of other people and their perceived status as contextual factors will have a strong influence on the activation of particular relevances. For example, the prestigiousness, exclusivity, and desirability of a personal item such as a camera, which is supposed to convey a certain image of its owner will be stronger in the presence of other people. In the absence of other people other utilitarian relevances around the camera's precision, functionality, and durability might then determine the perceiver's relationship with this particular object.

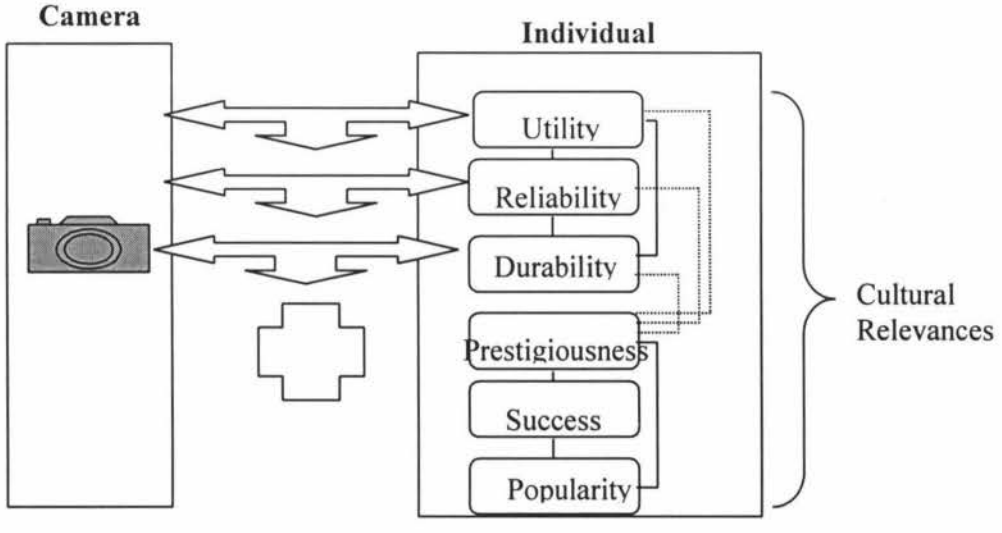

Figure 14: Example of active cultural relevances in the absence of other individuals.

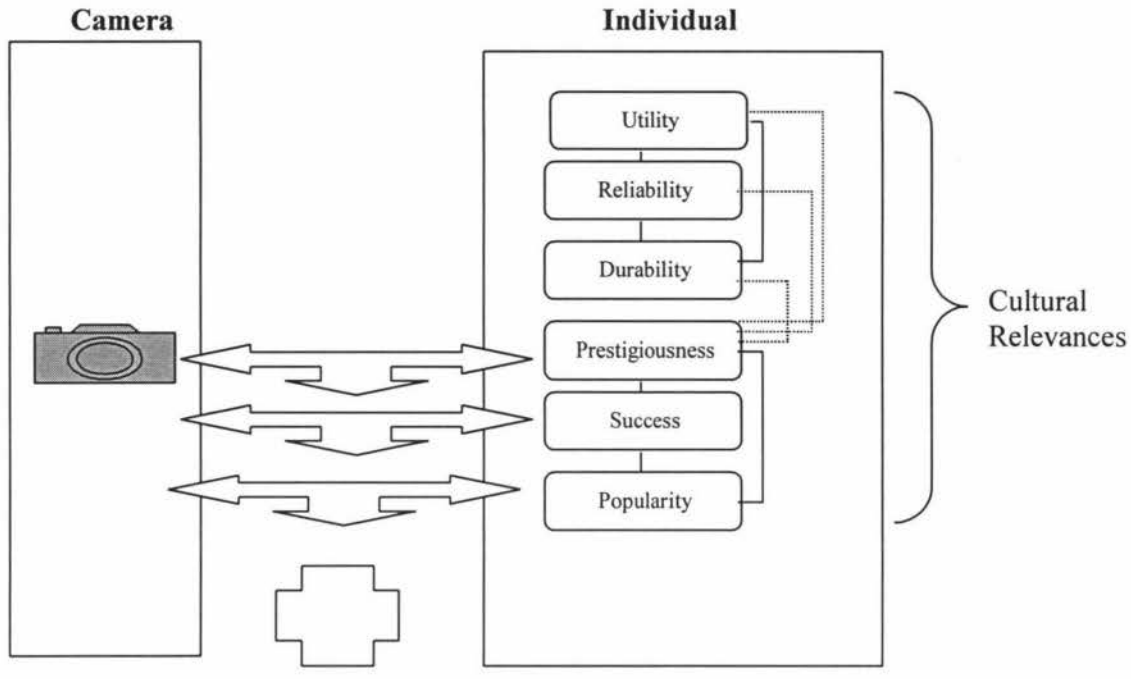

Figure 15: Example of active cultural relevances in the presence of other individuals

As these relevances can be of complimentary or contradictory nature the perceiver's relationship with the environment can be quite ambivalent at times. For example, the owner of a very prestigious yet unreliable car is bound to experience resonance and dissonance tendencies when approaching the vehicle in the presence of others in order to go for a drive.

Dangerousness and Familiarity Relevances

It is now necessary to make a brief detour into the common features of innate as well as cultural dangerousness and familiarity relevances, as these two lie at the heart of the proposed RD framework. An individual's dangerousness relevance as a reference pattern of the potential harmful impact of the environment on her body is presumed to have a crucial function for the perceiver as her very survival can hinge on being able to detect potentially harmful environmental elements in order to take appropriate self-preserving action. Familiarity with the environment is an essential precondition for any such appraisal.

A central building block of both types of proposed relevances of dangerousness is the notion that any individual is able to locate environmental elements along a

continuum of potential harmfulness. While there is certainly room for individual differences in this appraisal process – in particular when developmental aspects are taken into account – the location of elements along the safe-dangerousness continuum follows a general logic derived from the possible negative impact the element can exert on the individual.

The possible range of harm to the individual encompasses absolutely innocuous elements which under normal circumstances are unable to harm the perceiver. This qualifier is necessary, as practically any given aspect of the physical environment can be harmful in some ways if interacted with outside the normal range of behaviour. A lawn for example, consisting of nothing but nicely cut grass should not lead to a dissonance tendency on the grounds of a match with a perceiver's dangerousness relevance. Yet, if the human perceiver tries to eat a large amount of grass, this environmental element nevertheless has a certain deleterious potential to cause discomfort and maybe illness.

On the other extreme end of the dangerousness spectrum, there are environmental elements of which physical properties are bound to have a negative impact on any perceiver, regardless of this individual's coping resources. An attacking rattlesnake, a fired bullet, a bush fire, a high precipice, cyanide gas, a swimming pool filled with sulphuric acid, radioactivity leaking from a defective nuclear power plant, or a falling rock weighing ten tons; all of those environmental elements have a particular detrimental effect on any human organism. As a result, the harmfulness of any environment, or specific aspect thereof, can be located along a dangerousness continuum. This continuum ranges from extremely safe objects, sounds and odours to lethal ones.

Figure 16: Objective dangerousness continuum

Apart from those obviously dangerous or harmless environmental aspects, there are also elements about which only limited knowledge (or none at all) is available to the perceiver. This, because they are completely novel to them or represent significant deviations from familiar patterns. These elements, therefore, do not readily match with the perceiver's dangerousness relevance, nor with any other relevance for that matter.

This begs the question, of how the encounter between the perceiver and such elements fits into the RD framework as no reference pattern seems available for the proposed environmental appraisal process. The solution for this dilemma lies in the postulation of a relevance which is probably the most fundamental one of all, namely familiarity. Familiarity in this context refers to the degree to which the perceiver has knowledge about her environment. It is the most fundamental basis of an individual's appraisal process as it is a precondition for entering into any meaningful relationship with the environment. The appraisal process in terms of any other relevances, by necessity, is based on knowledge about that which is to be appraised.

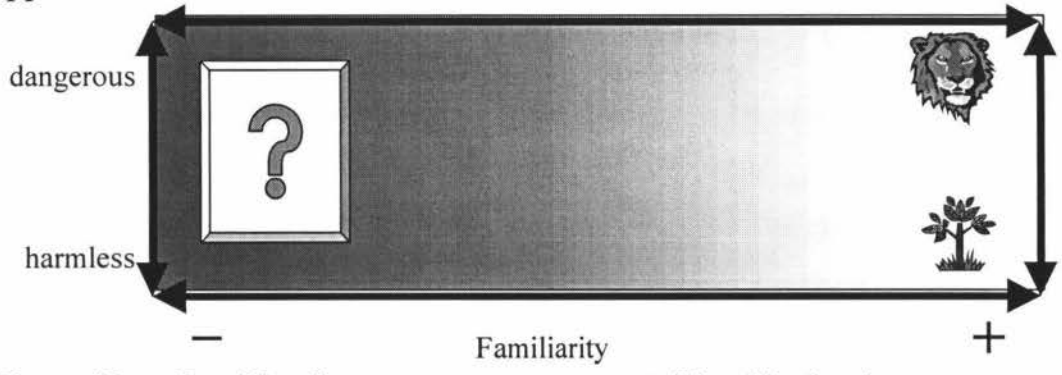

Figure 17: Cognitive dangerousness space, created by objective dangerousness of object and perceiver's knowledge about it.

A little thought experiment can illustrate the centrality of familiarity for the environmental appraisal process. Assuming, reports of alien abductions have proved correct for one individual who, somehow, got transported to another planet orbiting a green star. The inhabitants of this hypothetical world are nothing like anything this human has ever encountered before. And the vegetation, wildlife, technology, architecture and any other conceivable aspect of this alien

world that can be sensed by the individual are also so different from Earth that this person can not even be sure what actually is an alien, vegetation, wildlife or a building. In other words, this individual has no reference for anything he sees, hears, touches or smells. In this difficult situation, the individual simply will not be able to make any kind of judgement about his environment's dangerousness, nourishingness, pleasantness, and so forth. For all he knows, his existence might come to an abrupt end or it could be some kind of heaven. The point is, without knowledge about this place no appraisal about specific characteristics can be made.

Familiarity is proposed to be the broadest and most fundamental of all relevances (innate or cultural) as it serves the perceiver to undertake the earliest possible categorisation of environmental elements, namely known versus unknown. The outcome of this first appraisal process will lead to very different subsequent cognitive-affective processes. Any match with the familiarity relevance will enable a multitude of subsequent matching processes with any number of relevances. Any mismatch which represents a high degree of environmental uncertainty (Garling & Biel & Gustafsson, 1998) will create a need to learn more about it before it can be attempted to map it onto other relevances.

An encounter with something which is totally unknown is bound to be an exciting and unsettling experience. While it is difficult to observe reactions to unfamiliar objects, sounds and odours in adults because they have built up a more or less extensive knowledge base, it can readily be observed in small children who get fairly agitated when confronted with their first aeroplane in the sky or an elephant in the zoo or anything else they have not come across yet. Also, anthropologist's accounts of encounters with primitive tribes and their reaction to, from their point of view, strange-looking people and equipment provide some insight into human responses to unfamiliar elements (Eibl-Eibesfeld, 1993). In other words, the *lack of familiarity* leads to an experience of affective and cognitive dissonance. As has been hinted at before, a certain degree of unfamiliarity based dissonance for a limited

time can actually be quite stimulating and enjoyable. It is then a motivating factor behind explorative behaviour.

It is of conceptual importance here that not only the actual objective potential of the respective environmental element to harm, but its mere unfamiliarity to the perceiver is sufficient to establish a dissonance experience. This dissonance can be explained by a peculiar characteristic of the aforementioned dangerousness continuum along which environmental elements are located by the perceiver. It seems, that unusual and unfamiliar elements do not represent some kind of neutral middle ground to which the perceiver remains indifferent. Rather, these elements – until proven otherwise – tend to be located towards the dangerous extreme end.

That is, the degree of unfamiliarity of an element has a somewhat limiting influence on the position the element in question can assume within the perceiver's subjective dangerousness continuum as represented by the white space in figure 18. If no knowledge about an element is available to the perceiver, its location within the cognitive dangerousness continuum will be restricted to the area of "potentially dangerous to lethally dangerous". In other words, unfamiliar elements are usually regarded with suspicion and treated with caution by humans and other primates (Goodall, 1986 cited in Eibl-Eibesfeldt, 1993). This seems to be a phylogenetically determined tendency as it certainly has always been adaptive to err on the side of precaution or – as anthropologists suggest – even with aggression when confronted with the unknown.

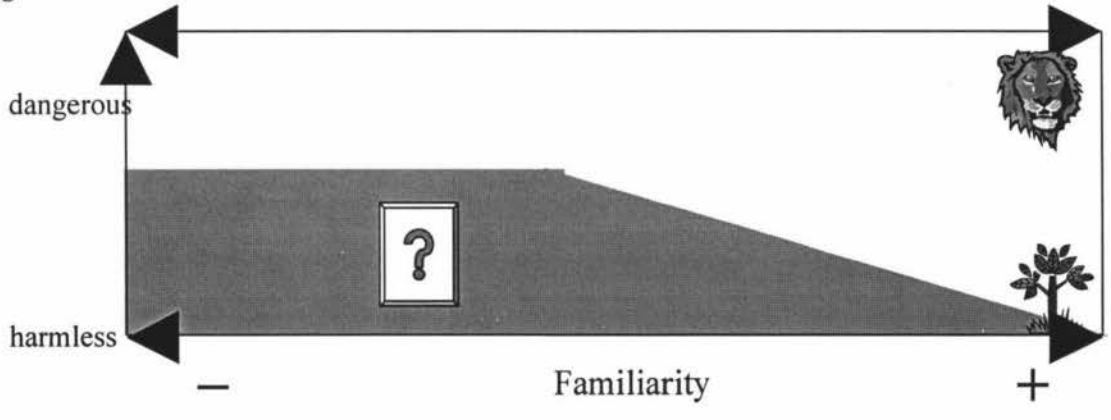

Figure 18: Cognitive dangerousness continuum limited by lack of knowledge.

Therefore, in reiterating the initial statement, that no other relevance can be applied in case of unfamiliar elements, it becomes now clear, that actually one other relevance will *automatically* be involved by such elements, namely the dangerousness relevance. In other words, unfamiliarity constitutes automatically a match with the perceiver's dangerousness relevance. The more the perceiver learns about the initially unknown element, the clearer the actual position of an element within the dangerousness continuum becomes and a more realistic subjective appraisal of the element's potential to harm the perceiver can be made. Again, the more becomes known the more other relevances can be applied, too.

The proposed automatic link between the outcome of the familiarity appraisal with the dangerousness appraisal is a very adaptive mechanism indeed. Existing etiological theories of anxiety, and phobias in particular, hold that specific features of an object, which is perceived as threatening, have to be detected and processed in order to elicit the individual's anxiety response. Conversely, the proposed RD framework does not require such a process and no specific dangerousness template or schema has to be matched in order to activate self-preserving cognitive-affective-physiological behavioural patterns. The mere detection of a deviation from existing familiarity reference patterns suffices to initiate adaptive processes. The function of the familiarity relevance therefore could best be described as that of an early warning mechanism.

Innate dangerousness and familiarity relevances

After having explored the underlying commonalties of both types (i.e. innate and cultural) of dangerousness and familiarity relevances it is now time to point out the fact, that several layers of familiarity of environmental elements do co-exist. For example, when an adult is coming across a dog on the street, chances are, that this individual has explicit knowledge about dogs in general, the particular breed, and maybe even the specific specimen which happens to be the neighbour's pet. A mismatch with the familiarity relevance on the level of the individual dog still allows for a wide variety of relevances to be applied as knowledge is available

about the particular breed. What kind of resonance or dissonance is going to emerge, then depends on the type of dog (e.g. big, threatening and strong breed or small and timid one) and the perceiver's schemata.

A mismatch with the familiarity relevance on the level of the particular breed of dog will allow for even fewer relevances to be applied as the perceiver cannot be sure of the dog's strength, aggressiveness and so forth. Finally, a mismatch on the level of the species – although hardly conceivable for adults – would mean, that no knowledge about this kind of animal is available and no other relevances can be applied. Yet – unlike the creatures the hypothetical alien abductee encounters – even in this situation the moving, breathing, furry object would not be completely alien to the human perceiver as it is assumed that the individual's innate phylogenetic familiarity relevance does encompass characteristics of naturally occurring moving, breathing, and furry objects.

In other words, the RD framework is based on the notion of a phylogenetic dimension of familiarity besides the common dimension of ontogenetic familiarity based on explicit knowledge. The notion of familiarity as an innate relevance grounded in implicit knowledge is based on the fact, that certain geomorphological and biological environmental elements have been predominant throughout human phylogenesis and in fact throughout the evolution of all life. That is, our ancestors within and beyond the human lineage have time and again encountered a fairly limited variety of naturally occurring patterns of sights, sounds and odours, which consequently have become a fundamental measure of "familiarity". It is proposed, that over the course of millions of years during which human patterns of perception, cognition and behaviour have been evolving along the parameters set by naturally occurring geological, atmospheric and biological events a profound affinity with these conditions has been established. This environmental affinity is conceived to be the phylogenetic analogue of an extremely long-term "mere exposure effect" (Bornstein, 1989).

In a rather crude metaphorical way of speaking, it could be said, that humans and a natural environment fit together like a key and a lock because the key has been cut with the lock providing the template. And if the key was able to conscious experience, its description of being in the lock would probably resemble accounts of human participants in qualitative research on the effects of being in a wilderness setting (Fredrickson & Anderson, 1999).

Nature is familiar

It follows logically that one of the main tenets of the proposed RD framework is the idea, that the term "phylogenetically familiar" is virtually synonymous with "natural". Conversely, the term " phylogenetically unfamiliar" can be looked at as a synonym for "artificial". The terms "natural" and "artificial", in the context of the RD framework, then, refer to certain perceptual qualities which allow affective resonance or dissonance to emerge in a perceiver and not necessarily to the source or origin of an environmental element.

It is important to note that at this stage the description of natural versus artificial features of environmental elements (and implicitly of whole settings) has to be of a tentative nature as this facet of the proposed RD framework is still wide open for empirical investigation. The theoretical grounding of this enterprise is the assumption, that artificial in this context does not necessarily refer to "human made" elements, even though in the traditional semantic sense, this is exactly its only possible meaning. If one substitutes the phrase "having been present frequently during human phylogenesis" for "natural" the significance of this concept becomes clearer. Artificial, then can be defined as "not-having-been-present frequently during human phylogenesis".

Previous attempts in defining nature or natural environments (and therefore implicitly corresponding innate templates) have partly been grounded in comparisons with built environments which are regarded as the antithesis of naturalness (Mausner, 1996). The absence of human intrusion as a crucial factor in the perception of a scenery as natural has been stressed in the 'few instances where

natural environments have been explicitly defined' (Mausner, 1996). Overall, however, the categorical dichotomy between natural and non-natural environments has remained rather vague.

The new definition of natural as phylogenetically familiar versus artificial as phylogenetically unfamiliar based on an element's presence during phylogenetically relevant periods of time seems more promising for theorising and research in the field of environmental psychology than previous attempts at defining this dichotomy (Mausner, 1996). It is more promising, because it is grounded in empirically validated multidisciplinary research results contrary to earlier concepts reliant on a more subjective and socially constructed origin. Palaeontology, in connection with biology and geology in particular, has been able to provide a reasonably coherent general picture of the prehistoric environmental conditions under which human phylogenesis has been taking place. For the argument presented here, it is not of crucial importance whether every detail of prehistoric flora and fauna have been described and reconstructed completely correctly on the basis of fossil records, ice core samples, and so forth. Critical are the broad characteristics of environments unchanged by human cultural activity. This, because it is assumed that these kinds of environment have shaped human innate relevances. The broad characteristics of such environments are proposed to be irregularity, fractal geometry, and diversity.

The RD framework, therefore, represents conceptual progress in that the characteristic properties of natural elements on the basis of evolution theory are specified. Contrary to the psychophysical approach, naturalness as synonym for phylogenetic familiarity is not seen to reside completely within the physical environment. At the same time, it is also not a completely arbitrary personal construct. The category of naturalness is thought to have arisen out of the frequent encounter between Homo sapiens and their ancestors and their respective physical environment.

The proposed innate familiarity relevance encompasses visual, auditory, tactile and olfactory reference patterns. Zajonc (1980) called such innate templates regulating one's affective stance towards environmental elements "preferenda". Zajonc's work, as well as that of Ulrich, (1981; 1983; Ulrich, Simons, Losito, Fioroto, Miles & Zelson, 1991) who built his theory of the restorative power of natural environments on humans on the postulate of stress reduction, have a common conceptual weakness. Both do not specify the traits, which render natural environments less stressful and more favourable to human beings. Zajonc merely stated that preferenda are broad and gross features of the environment and Ulrich, who does refers to Zajonc's theory, also does not go beyond this original vague statement.

Conversely, in the context of the proposed RD framework, the respective templates of phylogenetic familiarity (i.e. naturalness) can be postulated with a reasonable degree of specificity. The visual template is proposed to contain organic and fractal shapes. That is, natural elements are mostly of non-regular and non-geometric shape, do not possess lots of straight lines and perpendicular angles and consist of many "broken" shapes, lines and edges along all levels of magnitude. Their surfaces are most often of a diverse, irregular, rather dull, and graded character in terms of colours (i.e. mostly shades of green and brown), pattern and so forth. Tactile templates are naturally closely linked to those of visual surfaces. As natural categorised surfaces will have a tendency to appear rather uneven, irregular, and rough. Again, the auditory templates are conceived as geared towards variation which is the hallmark of naturally occurring sounds. Even continuous sources of sound such as flowing water, rain or ocean surf generate much more variation in their basic features of pitch, timbre, and loudness than mechanical sources of sound. Finally, olfactory templates of naturalness refer to biologically based odours emanating from soil, plants and animals.

It becomes clear now, that the categorical "natural versus artificial dichotomy" in the environmental appraisal process occupies a central role for the RD framework in respect to its explanatory power of previous research results in the field of

environmental psychology. It is assumed that test participants in many cases referred to the particular quality of phylogenetic familiarity when certain presentations of landscapes (e.g. photos) were categorised by them as natural and preferred over urban scenes. Furthermore, it is presumed, that an as natural perceived environment is conducive to the emergence of affective resonance tendencies while perceived artificiality is causally linked to affective dissonance tendencies. And both affective states are thought to have a directing and activating influence on other psycho-physiological functions of the perceiver.

The proposition of reference patterns of phylogenetic familiarity, encompassing broad, and fuzzy characteristics of objects, sounds, and odours, as innate means of environmental appraisal is not a revolutionary concept. Other existing psychological theories have build on similar ideas. The savannah theory by Orians (1980, 1986), for example, assumes that humans possess a fairly specific innate template of a landscape, which sustained our African ancestors for many generations millions of years ago. Preference judgements by test participants in favour of landscape paintings or photos depicting such savannah type sceneries have been brought forward as empirical evidence for this assumption.

The theories about preferred spatial configurations by Appleton (1988) and Rachel and Stephen Kaplan (1989) are also implicitly developed around the presence of innate templates of optimal spatial configurations. In a similar vein but in a different sub-field of psychology, the preparedness theory of phobias (Öhmann & Soares, 1993) presented the argument that innate reference patterns exist which makes it easier to learn to be anxious about specific animals, such as snakes and spiders. In going beyond this position, it has even been suggested that specific templates of such potentially dangerous animals are the proximal cause of anxiety reactions without any prior learning required (Bennett-Levy & Marteau, 1984; McNally, 1987). Finally, empirical evidence such as the famous "visual cliff experiment" (Gibson & Walk, 1960) also points to the fact, that humans have a certain degree of "a priori" knowledge (i.e. innate and not learned) about particular aspects of the physical world. It is not surprising that this kind of implicit

knowledge, which is applied in an automatic and subconscious fashion, refers to adaptational needs and threats.

Phylogenetic familiarity templates as innate means of environmental appraisal therefore represent a rather conservative concept when compared with already existing, and empirically supported, theories about specific facets of the relationship between the individual and their environment. As has been argued earlier, other templates referring to the environment's agency to nourish, to provide opportunity for use and manipulation, to please, to provide the opportunity to see but not to be seen and to get involved and to make sense, or to potentially harm are additional parts of the proposed RD framework.

In brief, any perceiver's innate phylogenetic familiarity relevance (as any other innate relevance) in the form of templates is proposed to have been shaped by natural environments, defined as environments unchanged by human cultural activity. If the current physical surroundings of a perceiver do not match with this relevance the environment will automatically be appraised as potentially dangerous, thus leading to affective dissonance. Dissonance might also arise from a match between the environment and more specific innate dangerousness templates about particular elements such as spiders, snakes, or a cliff, which have been developed by the human species during their phylogenesis.

Cultural dangerousness and familiarity relevances

It is now appropriate to revisit the issue of an environment's potential dangerousness from the perspective of cultural relevances. Beyond the affective dissonance emerging when the environment does not match with the perceiver's innate phylogenetic familiarity template, or if it does match with the dangerousness template, the individual has also cognitive schemata of harmfulness available in order to appraise her environment. Again, these schemata can only come into play if knowledge about the environment is available to the individual.

As has been said before: an attacking rattlesnake, a fired bullet, a bush fire, a high precipice, cyanide gas, a swimming pool filled with sulphuric acid, radioactivity leaking from a defective nuclear power plant, or a falling rock weighing ten tons; all of those environmental elements have a particular detrimental effect on a human organism. Therefore they should lead to the emergence of a strong cognitive dissonance based on their match with the perceiver's cultural dangerousness relevance.

However, as the content of the individual's cultural dangerousness relevance is dependent on explicit knowledge such a life-saving dissonance may actually not be experienced due to a lack of information which left the individual's particular schema incomplete. As for the radiation danger, this particular danger cannot even be part of the perceiver's relevant environment unless technological aides are utilised. Many other threats to the perceiver (e.g. food poisoning due to bacterial contamination) are not salient, and clues hinting at their very existence and potential to harm need to be learned by the individual. Again, the main difference between the innate and cultural dangerousness relevance lies in the fact that the latter is based on explicit knowledge which has to be acquired through ontogenetic learning.

The actual impact of an environmental element's inherent danger potential stemming from its physical properties, of course, is moderated by factors such as the individual's physique, skills, knowledge, and abilities. The perceiver's cultural dangerousness relevance therefore is shaped by his knowledge about these factors. As a corollary, the range of possible resonance or dissonance experiences is also influenced by them. For instance, water in the form of a nearby swimming pool probably leads to strong cognitive dissonance if that individual cannot swim. Once this particular skill has been mastered, the same environmental element (i.e. water filled swimming pool) does no longer match with the perceiver's now altered dangerousness relevance. This allows competing and contradicting relevances such as desirability, refreshingness, and opportunity for socialising to determine the relationship between the perceiver and the environmental element. Being in or

close to the pool has now become a much more enjoyable experience than it used to be.

As this example illustrates, the perceiver-environment relationship from the perspective of the proposed RD framework has a strong holistic character on every level of appraisal as neither the physical properties of the environmental element nor the perceiver's internal relevances in themselves result in resonance or dissonance. Only the potential physical interaction between the element and the perceiver transforms the element's (e.g. water) inherent danger potential (e.g. to deny breathing) into a concrete threat which manifests itself through cognitive dissonance. The interdependence of environment and relevances also becomes clear if one looks at the possible feedback loops which can alter the original relationship between these components. Cognitive environmental dissonance – much as Festinger (1957) envisaged – can lead to a behavioural change (e.g. learning how to swim, avoiding pools), which can lead to changes in the perceiver internal relevance or the external environment or both.

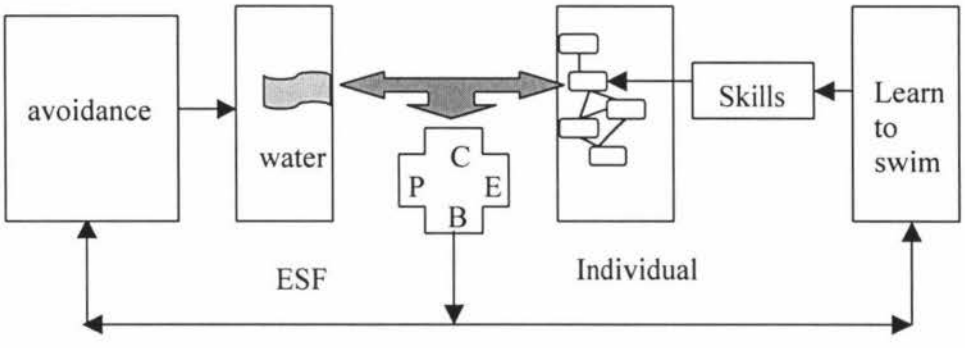

Figure 19: Behavioural feedback loop, which leads to changes in the ESF or cultural relevances, or both, by avoiding swimming pools and learning to swim.

Therefore, the cultural dangerousness relevance represents a bounded phenomenon. It is a personal phenomenon, in that it can contain reference patterns of objects which are dangerous to a particular perceiver yet safe to others. Depending on their respective skills, knowledge, abilities, and experience the perceiver will resonate or dissonate in their encounter with the element. The boundaries of this phenomenal, however, are set by those environmental elements

which carry an extreme inherent danger potential which cannot be compensated for by any human organism. For example, learning how to swim can prevent an individual from drowning in an ordinary pool or the ocean and building muscles can help to prevent a heavy object, carried by the perceiver, from smashing one's toes. However, swimming skills will not prevent death from falling into a pool filled with sulphuric acid and no fitness program can build up enough muscle power and flexibility to stop the fatal impact of a fall from a high cliff. On the other end of the spectrum, extremely harmless elements set another boundary.

Within these boundaries, the content of the individual's cultural dangerousness relevance can and does change over time. Public debate and the release of information on the health risks of smoking cigarettes or marijuana, for example, might induce some individuals to include these substances into their dangerousness schema while others might drop it from theirs. The point in question here is that the cultural dangerousness relevance, while subject to certain boundaries, is a mental structure, which is malleable and flexible over time like any other cultural relevance. Biological maturing processes as well as societal influences and personal learning experiences contribute to changes in a person's cultural relevances.

Interplay between both types of relevances

As has been pointed out earlier, cultural and innate relevances both play a role in an individual's environmental appraisal process. From the viewpoint of the proposed RD framework, they can be looked at as different subsystems addressing different levels of the individual-environment relationship. Innate relevances in the form of templates relate the individual to his environment in terms of fundamental adaptational needs. At the same time, cultural relevances relate the individual to specific aspects of his environment in terms of socially moulded needs and wants.

In coming back to the illustration of the perceiver's encounter with a dog, the most fundamental and implicit knowledge based appraisal process of this individual's

environment would lead to a categorisation of the dog as familiar in a phylogenetic sense. This, even though the specific specimen or the particular breed or even – if the perceiver is a small infant – the species is ontologically unfamiliar. The automatic appraisal of the animal as phylogenetically familiar is possible because the dog is a four-legged, furry creature and such creatures have accompanied humankind's evolution for millions of years. All four-legged, furry creatures have irregularity, fractal geometry and diversity as broad visual characteristics in common. Their odour certainly has an organic quality while the sounds they produce are marked by variety. They have been part of the environmental conditions which have been shaping human morphology, cognitive capabilities, behaviour and so forth. How humans see, hear, look, think and so forth has been partly dependent on the existence of four-legged furry creatures. As a result, the perception of the dog will lead to an affective environmental resonance tendency on the basis of his match with the perceiver's innate familiarity template

However, the dog certainly is not all that the perceiver is able to see, hear, smell and touch at the moment of their encounter. A multitude of other objects, sounds, and odours will be appraised at the same time. The presence of cars, buildings, people, an airplane in the sky, billboards, tar smoke from a nearby building site and so forth are contributing to a general affective resonance or dissonance tendency based on the innate familiarity relevance (as well as on other proposed relevances) applied to the whole situation. And the overall outcome of the appraisal process may be an experience dissonance despite the presence of an isolated natural element such as a dog.

As an illustration of the interplay of innate and cultural relevances one can think of an environmental element such as a precipice popular with mountain climbers. It can be further assumed that this precipice is located in one of the very hot and barren desert areas of the United States. Firstly, this cliff will match with the climber's innate familiarity template, thus leading to affective resonance. On the other hand, this element has also the potential to harm anyone falling from the top

of it. Based on the "visual cliff experiments", it can be assumed that whenever such a potentially dangerous situation is being encountered by an individual, affective dissonance will automatically emerge because of the element's congruency with an innate dangerousness relevance. That is, the same element can lead to concurrent contradicting affective resonance and dissonance tendencies in the perceiver. It can be theorised that the match with the climber's innate dangerousness relevance and the mismatch with her innate nourishingness, pleasantness, refuge, and mystery relevances takes precedence and the resulting overall affective frame will be one of dissonance.

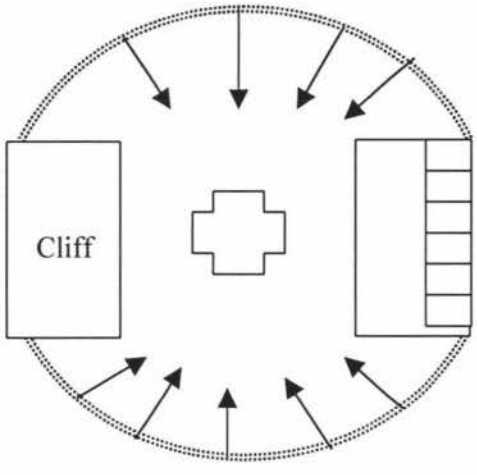

Figure 20: Underlying affective dissonance frame due to the cliff environment's match with innate dangerousness relevance and mismatch with innate nourishingness and pleasantness relevances.

Yet, as affective and cognitive appraisal processes are taking place simultaneously it is possible – and in fact quite common – that the affective dissonance tendency will be overridden by cognitive processes. The encounter of an experienced mountain climber with a cliff, which is located in an uninviting and barren desert setting, is still thought to lead to the emergence of an automatic affective dissonance tendency based on the match between the innate dangerousness relevance and the sight of the cliff. However, due to the climber's skills and expertise in dealing with cliffs, her explicit knowledge-based cultural dangerousness relevance does *not* match this particular environmental element. As she knows how to scale the precipice safely, other positive cultural relevances such

as freedom, challenge, success, and popularity probably do match and lead to cognitive resonance tendencies.

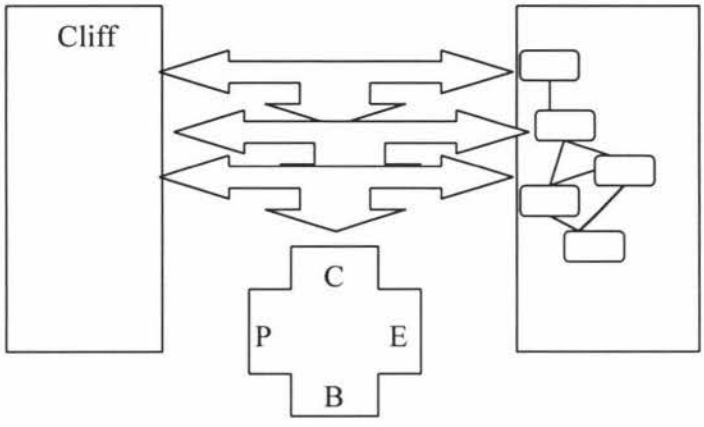

Figure 21: Cognitive resonance due to the cliff environment's match with the climber's cultural relevances.

As has been explained, corresponding psycho-physiological sequelae are the result of affective or cognitive resonance or dissonance and contradicting tendencies will emerge. That is, even though the match between the climber's innate dangerousness schema and the environment is conducive to an affective dissonance experience, the actual conscious experience when faced with a cliff is likely to be one of anticipation, challenge, excitement and joy (i.e. resonance) because other cultural relevances are stronger in determining the outcome of the appraisal process in terms of the individual's conscious experience. This does not mean, that the underlying affective dissonance tendency comes to an end, though. On the contrary, it is assumed that it will persist (and maybe thus keeps adding to the excitement by sustained sympathetic nervous activity) but, that other competing cognitive resonance tendencies and their sequelae will be experienced consciously. On the other hand, dissonance, of course, would emerge even more strongly if the environment matched the perceiver's cultural dangerousness relevance as well. That is, someone who has no experience and skills as a climber is very likely to experience affective as well as cognitive dissonance when faced with the same situation.

In other words, a co-existence of divergent resonance and dissonance tendencies is postulated. Furthermore these concurrent tendencies are seen as addressing different levels of the individual's relationship with their environment. While innate relevances contribute to the maintenance and modulation of a continuous and underlying affective frame on the basis of the environment's agency to meet the perceiver's adaptational needs, cultural relevances are seen as linking the individual cognitively and subsequently affectively to specific aspects of the environment in terms of their agency to meet socially influenced needs and wants. Cultural relevances exert their influence on the individual's psycho-physiological functioning against the backdrop of the underlying affective frame based on innate relevances.

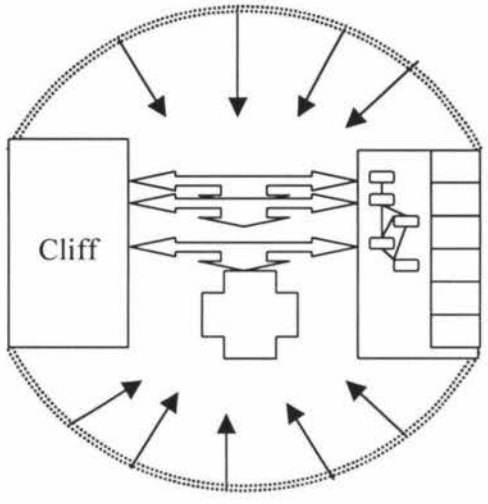

Figure 22: Climber's cognitive resonance embedded within underlying affective dissonance frame.

Summary

In summary, two types of relevance, innate and cultural, provide a perceiver with an internal yardstick with which their perceived environment is appraised. Positive relevances are geared toward benign aspects of the environment (i.e. its agency to meet the perceiver's wants and needs). Negative relevances are geared toward malignant aspects (i.e. environment's lacking agency to meet one's needs). Innate relevances are conceived as being based on implicit knowledge, which does

not have to be acquired but is present in the form of an a priori genetic memory. Innate relevances are associated with sub cortical structures and therefore primarily with affective processing. As they are the result of evolutionary processes spanning millions of years of human phylogenesis, they are thought to represent inflexible templates impervious to the influence of ontogenetic learning. Innate relevances are the basis of a continuous appraisal process of the perceiver's entire physical surroundings in terms of a small number of fundamental characteristics.

Cultural relevances, on the other hand, are conceived to be based on explicit knowledge acquired by the individual through various forms of learning. They are associated with neocortical structures and therefore with cognitive processing. Cultural relevances are seen as flexible and malleable schemata which are constantly influenced and reconstructed due to ongoing learning processes. A theoretically infinite number of cultural relevances provide a link between the perceiver and specific environmental elements. Their application is thought to be of a transient and temporally limited nature. Cultural relevances are thought to be organised in a network-like structure. They can be activated by current sensory information or by other cognitive processes such as memory and planning. A variety of complimentary or competing innate and cultural relevances link an environment affectively and cognitively to the perceiver at the same time. While innate relevances contribute to the maintenance and modulation of a continuous, underlying affective frame, cultural relevances are seen as linking the individual cognitively and emotionally to specific aspects of the environment against this affective background.

The proposed theory of relevances as one link in a chain of interconnected concepts, which together constitute the RD framework of perception, pertains to the perceiver internal end of the individual-environment relationship which is marked by resonance at some times and dissonance at other times. It is now appropriate to turn to the external end of this relationship and to explore the scope

and nature of those aspects of physical reality which are accessible to human beings through their sensory mechanism. The proposed theory of the environmental sensory field, which represents a combination of empirically and theoretically derived conceptualisations (Gärling, 1998), will shed more light on this issue.

What do we perceive? — Theory of the Environmental Sensory Field

The process of environmental appraisal as conceptualised in the proposed RD framework is inherently based on a systemic view of the relationship between perceiver and environment. That is, a number of components are thought to be inextricably interlinked. The result of their interaction is conceived as the emergence of cognitive and affective resonance or dissonance. Perceiver internal relevances link the perceiver to the environment and vice versa in a meaningful way whereby acquisition of sensory information represents the mediating process necessary to bring distal cues and proximal schemata and templates into contact.

Post-classical physics have provided the "new" world view that the individual and their physical surroundings are integral elements of a four dimensional space-time continuum as conceptualised by Einstein in his work on general and specific relativity (Einstein, 1961). That is, no absolute dichotomy between perceiver internal relevances and that which is being perceived is presupposed. Rather, both elements of the individual-environment perception system are temporarily and subjectively distinct from each other, yet represent always intricately interwoven phenomena of the same fundamental reality.

The emphasis in conceptualising the perceiver's Environmental Sensory Field (ESF) as the arena in which the contact between distal and proximal components is taking place, lies in the interactive character of the whole individual-environment system. Both the perceiver's species and the environment have co-evolved over millions of years. Human perceptual capabilities are structured morphologically and cognitively the way they are because they have been proved to be adaptive

along the parameters set by geomorphological, atmospheric, and relevant extra-terrestrial conditions.

The character of this individual-environment system as an intricate fabric of interwoven components instead of totally independent entities warrants the use of the metaphor of a field in describing the relationship between the perceiver and that which is being perceived. Important in this view is not so much the analysis of the molar or molecular building blocks of the surroundings or those of the perception mechanisms, even though this kind of analysis will have to be undertaken for explanatory purposes. Instead the fundamental nature of the relationship between the individual and the relevant part of space-time will be the focus. As has been already stated, this relationship encompasses different layers, of which the individual's adapational and cultural needs are the object of theorising within the proposed RD model. In analogy to the function of electromagnetic fields in information technology applications, the interaction between perceiver and environment on the level of adaptational needs does not represent a sequence of discrete events, but a modulation of a continuous underlying process.

Factors determining the ESF content

Human beings and their phylogenetic predecessors have been constituting a co-evolving structure with the geophysical phenomena of the Earth's surface, including extraterrestrial influences such as radiation which have had an impact on this system. The co-evolving nature of this system stems from the fact that Earth itself, as the main stage of biological evolution, has changed and evolved over time. This change process has been setting the parameters for the evolution of life, which has had to adapt to a variety of geological and atmospheric events, sometimes of cataclysmic proportions.

The proposed RD framework has a deeply evolutionary grounding in that it assumes that all elements of the system have been developed under the same set of rules or guiding principles. Evolution is hereby seen as a general principle beyond purely biological processes (Goerner, 1995). Intergalactic events, conceptualised by

theories such as the "big bang" theory of the creation of the universe (Silk, 1980), interplanetary events, such as the formation of the sun and the planets, as well as subsequent impacts on Earth by asteroids and comets, have all played their role in the emergence of conscious entities who are able to perceive and reflect on their surrounding physical reality. These events have also decisively shaped the face of the Earth. That is, without any one of these events, human morphology, cognition, and behaviour would probably be different or even non-existent.

Apart from setting the historic preconditions of biological, mammal, and human evolution, extraterrestrial events still play a crucial role in setting the physical external parameters of perception. Earth's rotation around its axis as well as its journey around the sun in connection with the sun's production of heat and light have a profound impact on any perceiver's ESF through the provision of illumination, the sequence of seasons, and the formation of clouds and general weather patterns. The moon's rotation around Earth and the associated gravitational forces have a decisive influence on the degree of nocturnal indirect illumination as well as the shape of shorelines. Finally, interplanetary bodies such as comets and meteorites are apt to change a perceiver's nocturnal visual sub-field when coming into visibility range and burning up in Earth's atmosphere.

The existence of conscious entities able to reflect on the richness of the phenomena surrounding them gives testimony to the guiding principles of the biological aspect of evolution (Darwin, 1859). Self-preservation and procreation as the ultimate goals of organisms have emerged out of this process. Morphological structures, as well as cognitive and affective processes which support the achievement of these goals, have correspondingly emerged. The ability to appraise one's physical surroundings in terms of its benignity or malignancy is one of those processes which have developed over the course of millions of years.

In most recent geological times human activity has become the paramount force impacting on all environmental parameters. However, this capacity to impact on earth's geomorphology, climate and biomass, which has been brought about

mainly by technological means, is not the first incident of global changes initiated by biological processes rather than geological or cosmological ones. The immense change in Earth's atmospheric conditions due to the production of oxygen by algae is one example of such a global change. The evolutionary viewpoint adopted in this thesis assumes, that many aspects of observable human morphology, cognition, affect, and behavioural tendencies had been shaped by the parameters set by the natural environment before human impact became the driving force of planetary change.

Human perception, that is the intersection between distal environmental information and the perceiver's relevances, relies fundamentally on the individual's sensory capabilities. Sensory organs, which have been evolved to capture certain aspects of reality, allow the individual to form a mental representation of their physical surroundings. Receptor cells for visual, auditory, olfactory, tactile, and gustatory information are incorporated into a typical human system (Coren, Ward & Enns, 1994; Kalat, 1995). Additional information about the position of one's own body parts (i.e. proprioception) and the entire body's orientation and position in relation to a gravitational centre (i.e. vestibular system), are also available.

However, in the context of the proposed RD framework, proprioception and the vestibular system are deliberately neglected. Notwithstanding the fact that the movement and position of parts of the body are influenced by environmental factors, the former modality has not been included, because it relates to internal information about the body of the perceiver and not to the physical surroundings. The vestibular system has not been incorporated into the proposed framework, because only in extreme cases (e.g. spaceflight) the phylogenetically familiar range of experiences will be exceeded. Therefore, this aspect was omitted as largely irrelevant for the intended scope of the RD framework, which pertains to human beings, who are located on the face of the Earth.

What can be perceived, therefore, varies in correspondence with changes in a number of components of the individual's sensory system. The sensitivity of the individual's reception mechanism sets the limit of the perceptual range of a particular sensory modality. Psychophysics is the main psychological subdiscipline in pursuit of testing and formulating these limits (Engen, 1971; Fechner, 1966). Individual variation as well as changes in the individual's sensory perceptual limits due to illness, trauma, maturing or ageing processes inevitably also change the boundaries of what can be seen, heard, smelled, felt, and tasted. Perception, in this respect, is a highly idiosyncratic process and the accessible aspects of the surrounding four-dimensional space-time create a very personal experience (Pollio, Henley & Thompson, 1997). At the same time, it is assumed, that this phenomenal is a bounded one. That is, two individuals of similar sensory capability which are located close to each other are thought to form very similar mental representations of their physical environment. The presumed similarity, of course, does not extend to the myriad of possible interpretations of the meaning and importance of that which is being perceived.

As an example, it could be assumed, that a scarlet Ferrari in front of two individuals of similar sensory capabilities will be mentally represented in a very similar way. However, as has been explained in the section on the theory of relevances, the reactions of the individuals to this object will be heavily influenced by their respective idiosyncratic cultural relevances.

The fundamentally holistic and interactional nature of perception per se, as well as perception-based appraisal processes, becomes clear when perceiver locomotion is taken into account. Any voluntary movement of the perceiver's body and the incorporated receptor organs will inevitably change what is being perceived. On the other hand, any movement of environmental elements will also have a similar effect.

Furthermore, geomorphological and atmospheric conditions have a considerable influence on the individual's current sensory boundaries. For instance, visual

perception, without taking into account any of the aforementioned internal causes of variation, can have a range from only a few millimetres to more than two million light-years. The former boundary comes into effect whenever one tries to discern minute objects with the naked eye, while the latter limit of vision refers to the sight of stars and whole galaxies during a clear night. In between these extremes, phenomena such as fog, smoke, ocean spray, haze have a limiting influence on someone's vision. In terms of audition, water, walls, and dense vegetation play a crucial role in setting limits to one's sensory capabilities. In terms of olfaction wind direction has a similar influence.

Again, any changes of the physical surroundings which take place within the perceptual capability boundaries of an individual will also eventuate in corresponding change in the arena of the environment-relevance encounter. An earthquake, the impact of a bomb, the outbreak of a volcano or other less cataclysmic events such as a person, animal or other moving sources of sensory information entering one's visual, olfactory or auditory field inevitably change the type and amount of sensory information available to the perceiver.

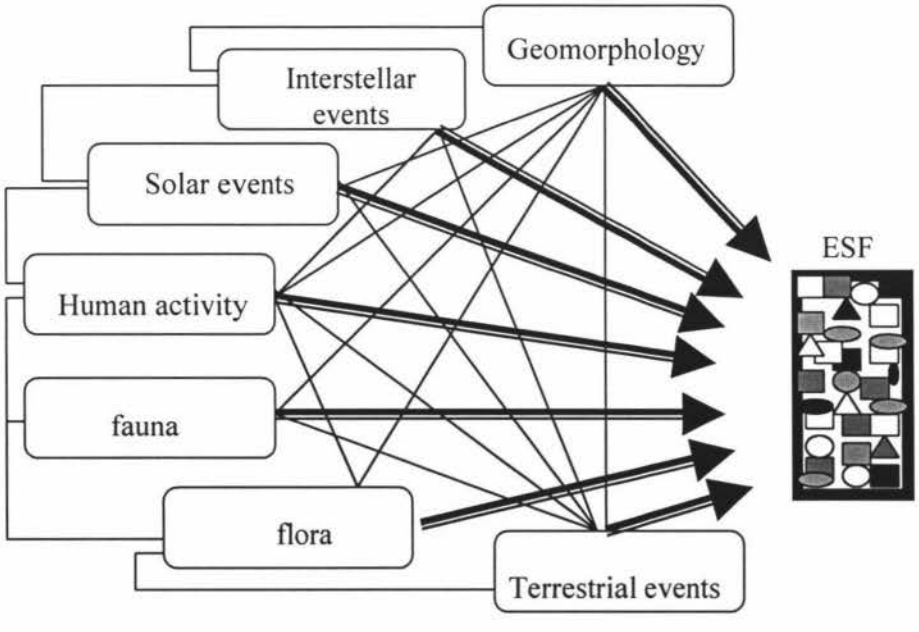

Figure 23: Factors, determining the individual's ESF content.

Scope and levels of the ESF

As a result, the entirety of that which can be perceived by an individual establishes this individual's private Environmental Sensory Continuum (ESF). The range and shape of the ESF is determined by the individual's idiosyncratic perceptual capabilities and the contextual variables which impact on these capabilities. The boundaries of the individual's ESF are usually not clear cut and discernible. The visual, the auditory, and the olfactory sensory field are fuzzy and their edges tend to "fade out and in" gradually.

Tactile and gustatory sensations, on the other hand, represent a much more focused and contained type of environmental information. Only a small sector of the physical surroundings can be accessed via these sensory modalities at the same time. The information horizon provided by the perceiver's vestibular system and proprioception mechanism is, of course, limited to their body itself.

The various sensory fields created by the interplay between the respective receptor mechanisms and surrounding space-time constitute overlapping fields of sensory information which are fused together into a holistic impression by the perceiver, who represents the point of convergence. The visual appearance, smell, sound, and touch of a single object combine into a coherent mental representation. The same principle applies to the totality of what can be sensed by the perceiver; that is, all the sights, sounds, odours, and touch sensations at any given moment combine to form a generally coherent mental representation of one's physical surroundings. Coherence is such a strong principle of perception, that existing gaps (e.g. blind spot) are even filled in by neuronal mechanisms (Kalat, 1995).

If all causes of change of the content of the ESF are considered, a picture of an extremely dynamic and holistic phenomenon emerges. For example, if one imagines the incredible amount of sensory information accessed by a person dancing with a partner in a ballroom, it becomes clear that attempts to reduce this experience conceptually to a sequence of discrete "sensation quants" which are being processed sequentially by a computer-like structure must fail to capture the

richness of the encounter between the perceiver's distal and proximal reality. The concept of perception as a continuous process of "modulation" of cognitive and affective states seems to map much better onto the complexity and richness of real life perception than the traditional cognitive computer processing analogy approach. However, as has been stated before, the RD framework is not a theory of perception per se, but one about the ensuing relationship between perceiver and percept.

While it is assumed that the perceiver forms a more or less coherent and holistic mental representation of their physical environment as the basis of the proposed appraisal process, for research purposes (and for those purposes only!), it will be necessary to "dissect" the ESF into several layers depending on the particular sensory modalities involved. The highest level of analysis which will be called the Macro level, applies to the entirety of an individual's overlapping sensory fields. The ESF itself, therefore, is the object of analysis on this level. It is the sector of space-time, which is accessible to the individual as a whole gestalt, to which individuals relate in terms of their adapational needs. That is, the fundamental relationship between perceiver and environment emerges from the encounter between the entire perceptually accessible environment and the perceiver's innate relevances.

The Meso level of analysis of the ESF refers to the level of distinguishable environmental elements. In their entirety, they constitute the perceiver's ESF and at the same time are embedded in it. The fluctuation in the flow of perceptual information within the entire ESF – as far as changes originating externally to the perceiver are concerned – stems from changes in the position, momentum, and intensity of these elements. These elements, which could be described as whole entities or gestalten in themselves, can be identified for each respective sensory modality dependent sub-layer of the ESF.

Visible objects such as people, cars, flowers, animals, and TV sets, as well as large-scale regions of the perceiver's visual field, such as sky and background landscape

features (e.g. mountain, ocean, forest, urban subdivision), constitute visual environmental elements within the visual sub-field of the individual's ESF. Any kind of distinct sound pattern such as music, spoken language, the singing of birds, howl of wind, and the roar of a starting aeroplane constitutes an auditory environmental element within the auditory sub-field of the individual's ESF. Distinguishable odours (e.g., diesel fumes, scent of freshly cut grass, perfume) constitute olfactory environmental elements within the olfactory sub-field of the individual's ESF. Finally, different surfaces such as human skin, textiles, gib board walls or sheep skin provide distinguishable touch sensations which constitute tactile environmental elements within the tactile sub-field of the individual's ESF.

Another important set of attributes of an environmental element is that of its relational characteristics, that is, its position, momentum, and trajectory relative to the perceiver. Most environmental elements existing in the universe are, of course, completely out of the sensory range of an individual. Only a minute fragment of what is happening at any given moment in time on Earth (or other interplanetary or interstellar bodies) is actually accessible to the perceiver. Everything else which cannot be perceived because it is out of range, or which is in range but cannot be perceived due to a lack of the necessary reception organs (e.g. radioactive radiation, ultrasound, UV rays), is by definition not part of this individual's ESF.

Technology can, of course, provide an extension of sensory capabilities, and has allowed humans to detect and appraise parts of space-time which were previously outside of the species' accessible electromagnetic and acoustic bandwidth (e.g. UV rays, x-rays, ultrasound, infrared) or outside the perceivable order of magnitude (e.g., microbes, galaxies 15 billion light years from earth, the surface of Jupiter moons). However, these technological extensions still provide no direct perceptual access to previously hidden dimensions of reality as the results of any such device have to be "translated" into a form which can be perceived by a human. That is, the clicks of a Geiger counter, the printouts of a spectroscope or the pictures from an X-ray device, Hubble space telescope, or electronic microscope, represent usually inaccessible aspects of reality which have been transformed into "ordinary" visual

and auditory elements. In the context of the RD framework, this means that any such picture or printout, and not the original aspect of space-time to which it refers, is regarded as an environmental element within the perceiver's ESF.

There is also the possibility to engage in a Micro level analysis of an individual's environment as any environmental element itself possesses formal features which render it distinct from other elements, thus creating an identifiable gestalt. Gestalt, in this context, does not only refer to visual objects but also includes odours, sounds and surfaces which are being perceived as coherent units. As mentioned earlier, the neurophysiological and cognitive processes leading to the formation of a mental representation of environmental elements in the perceiver are not the focus of the ESF model. The perception of elements as a coherent form or gestalt is taken as a given. Again, for each type of element their characteristics can be identified along various continua.

This kind of Micro level analysis assumes conceptual importance for the process of delineating the differences between natural environments and those dominated by artefacts. As has been argued in the preceding chapters, these different types of environment seem to lead to fundamentally different affective resonance or dissonance patterns in most perceivers. However, it is important to note that, while this level of analysis is necessary to point to certain differences in one component of the perceptual system, it does not represents an attempt to explain variances in the individual-environment relationship on the basis of this aspect only. The influence of micro level aspects of perception as it is emphasised by empirical aesthetics approaches (e.g., Berlyne, 1970) is seen as one component in a network of intricately interwoven processes.

Natural versus artificial elements

In the preceding chapter on the theory of relevances, the conceptualisation of natural and artificial as synonyms for "phylogenetically familiar" and "phylogenetically unfamiliar" respectively was presented. The terms "natural" and "artificial", in the context of the RD framework, therefore refer to certain perceptual

qualities which allow affective resonance or dissonance to emerge in a perceiver and not necessarily to the source or origin of a particular environmental element.

For the individual's visual sub-field this means that natural elements are seen as featuring organic and fractal shapes. That is, natural visual elements are mostly of non-regular and non-geometric shape, predominantly do not feature straight lines and perpendicular angles and consist of many "broken" shapes along all levels of magnitude. Their surfaces are most often of a diverse, irregular, rather dull, and graded character in terms of colours (e.g. mostly shades of green and brown) and patterns. Artificial visual elements, on the other hand, are thought to represent the opposite end of the surface and shape continua. That is, they are thought to be of a more inorganic, regular and geometrical shape. Their surfaces are more monotonous and of a brightly coloured or even metallic shining quality.Tactile elements have basic features which are closely linked to those of visual elements' surfaces. Natural surfaces will have a tendency to appear rather irregular, uneven and rough, while a quality of artificiality can be attributed to very smooth and even surfaces or surfaces featuring very regular patterns. An auditory element's basic features are pitch, timbre, and loudness (Coren & Ward & Enns, 1994). That is, the amplitude, frequency, and purity of a sound determine its character. Again, a great degree of variation is the hallmark of naturally occurring sounds. Even continuous sources of sound such as flowing water, rain or ocean surf generate variation in these basic features. On the other hand, regularity of patterns (i.e. melody) as well as its purity and – sometimes – its sheer loudness, are hallmarks of artificial sounds. Finally, olfactory elements which are being perceived as artificial are more likely to have a certain inorganic quality pointing to mineral based chemical processes as their sources as opposed to biologically based odours emanating from soil, plants and animals.

In many cases the environmental element's immanent qualities are actually linked to its origin but not by necessity. As a matter of fact, there are elements which are perceived to be "natural" even though they are actually artefacts made by humans. Well-crafted artificial flowers are an example of such quasi-natural elements

where non-natural origin will remain undetected unless they are subjected to fairly close scrutiny. Computer-generated visual and auditory elements in movies or computer/video games such as Myst and Riven (Broederbund, 1993; 1997) have become another illustration of how highly sophisticated technology can create artificial environmental elements with a lifelike quality. In the same vein, a very practical and long-standing application of disguising artefacts as natural have been camouflage techniques used in warfare. The military have known for many years that personnel and machinery can be hidden from the enemy by blending it into the surrounding environment by mimicking certain features of naturally occurring visual elements. Of course, the term camouflage in itself does not necessarily imply imitating nature per se as it is dependent on the context in which it is being done. For example, blending into an urban streetscene requires different techniques than blending into the undergrowth of a bush setting. Also, camouflage is by no means a human invention, but has been an adaptive strategy for animal predators such as polar bear, chameleon or rock fish as well as prey such as moths and snow rabbits.

At the same time, there have always been instances of naturally occurring yet rare environmental elements with a certain "artificial and unreal quality". Geomorphological formations such as the "Giant's Causeway" in Northern Ireland, the "Moeraki Boulders", the "Punakaiki pancake rocks" or the former "pink terraces of Tarawera" in New Zealand have always been the object of speculation, adoration and mystification because their features were so unusual. Such rock and stone formations or, on a smaller scale, crystals and diamonds of geometrical and regular shape and bright colours are naturally occurring phenomena with highly unusual features. That means, that even though such naturally-occuring quasi-artefacts have been accompanied human phylogenesis throughout the millennia, humans, on average, have not been exposed to them to the same degree as they have been to ordinary landscape features such as grass, trees, and ordinary rocks.

Again, examples such as the lion fish or several species of poisonous snakes and frogs illustrate "deliberate" (in an evolutionary/ adaptive sense) utilisation of

unusual features such as bright colours and distinct geometric patterns in order to signal their actual or pretend dangerousness to potential hunters. The same principle holds for contemporary applications such as sirens and flashing lights on ambulances, fire-engines, and police vehicles. The sounds and sights generated by these devices are highly distinct due to the relative infrequency with which we encounter them. It is assumed, that their artificial character stems from the fact that such elements with such characteristics have not played a role in human phylogenesis. By the same token, it becomes clear that "natural" and "artificial" are not closed categories. That is, given enough time (i.e. millions of years), it is entirely conceivable that elements and features which are now regarded as "artificial" will become familiar, and therefore will come to be categorised as "natural" at some point in the rather distant future.

On a yet deeper level of analysis, namely the Nano level, elements as composite wholes which are build up by basic features can theoretically be dissected even further into their constituting components.The term basic components refers to the molecular structure which underlies any discernible feature. That is, a visual element's features could be reduced to atoms and molecules which combine to form structures which can be seen with the naked eye. The same applies to an auditory element's underlying dynamic of air molecules, an olfactory element's constituting chemical compounds, and a tactile element's molecular structure.

As nuclear physics research using particle accelerators has been able to demonstrate, the endeavour to achieve reductionism's holy grail of discovering the most fundamental building blocks of physical reality (and therefore of the ESF) has not yet reached its end, and theoretically, any environmental element's atomic structure could be further dissected into subatomic particles and wave functions (Heisenberg, 1973) thus representing the Piko level of analysis.

Occasionally, references to the underlying Micro level of features might be necessary to better understand the relationship between a perceiver and particular elements. However, for the proposed psychological theory of perception, the

relevant level of analysis will be the Meso level of elements and the Macro level of an individual's entire ESF as the levels of external physical reality humans directly interact with.

In summary, the Environmental Sensory Field is an idiosyncratic phenomenal created by the interaction between the individual's sensory apparatus and the entirety of space-time. It represents that minute part of space-time which is immediately accessible to individuals and with which they are in constant contact. The ESF represents a dynamic and extremely variable field of sensory information with the individual as the point of convergence.

The content of this information has historically been determined by terrestrial (e.g. wind, volcanic activity) and extraterrestrial (e.g. meterorites, radiation) events which have shaped geomorphological and atmospheric conditions on Earth. The "natural" content of a perceiver's ESF, therefore, is assumed to be constituted by - phylogenetically speaking – predominant and frequently occurring elements to which humans have been exposed during most of their phylogensis. In most recent times, human activity in the form of creating artefacts as small as a toothpick or as big as a high rise building has become the dominant force in shaping most peoples' ESF. It is assumed, that human activity results in largely artificial, phylogenetically infrequent elements to which humans have been increasingly exposed for only approximately 10,000 years.

The available information about the surrounding part of space-time is thought to be integrated by the perceiver into a holistic mental representation. For the purpose of scientific analysis, the ESF proper (i.e. Macro level) can conceptually be broken down into elements (i.e. Meso Level), their basic features (i.e. Micro Level), their molecular structures (i.e. Nano Level), and their subatomic underpinnings (i.e. Piko Level). Of practical relevance for the individual, and therefore for the RD framework, are the Macro and Meso levels only. They represent the level of reality encountered by the perceiver without technological aides.

The picture of the individual-environment relationship as envisaged by the RD framework so far encompasses the perceiver internal component in the form of relevances, the external aspect in the form of the ESF, as well as the result of the encounter of these components in the form of affective and cognitive resonance or dissonance. These concepts combined make it possible to integrate a variety of research findings in environmental and clinical psychology. Yet, the proposed model can be extended beyond these domains as it represents a series of interlocking concepts. One of these concepts pertains to the question of which aspects of one's environment actually do enter one's consciousness and which aspects are being processed outside of one's awareness. In order to delineate the processes behind the distinction between resonance or dissonance tendencies and experiences, the theory of the Environmental Awareness Continuum will be presented in the following chapter.

What do we notice? — Theory of Environmental Awareness Continuum (and relational intensity)

So far, the encounter between distal environmental information and proximal relevances has been described. Resonance and dissonance are emerging out of this encounter. Psycho-physiological sequelae, such as cognitions, emotions, physiological responses, and behaviour, are influenced by this process. The point has been made that resonance and dissonance can remain subconscious tendencies or might assume the character of conscious experiences.

Therefore, the question remains, how the mental representation of the physical surroundings, formed by the perceiver, relates to this process. It has already been stated that the neurological-cognitive mechanisms, which enable human beings to form such representations, are not the focus of the proposed RD framework. The perception of objects, sounds, odours, surfaces, and taste by the individual is taken as a given phenomenon. The fact that not all processes necessary to produce these conscious percepts have been discovered and explained, as illustrated by competing theories on colour and pitch perception (Coren, Ward & Enns, 1994; Kalat, 1995), does not prevent theorising and research using the final product of these processes.

In the context of the proposed theoretical framework, it is assumed that two independent, yet interlinked, systems are in place in order to appraise the environment in terms of its agency to meet adaptational as well as cultural needs and wants. Sensory information is thought to be processed in the sub cortical

affective system and the neocortical cognitive system. The outcome of these processes, in the form of an endless feedback loop, are relayed to the respective complementary system for further processing (LeDoux, 1996). The perceiver may or may not be aware of these processes or even their outcome. Research has shown that a big proportion of cognitive (Bargh & Chartrand, 1999; Merikle & Daneman, 1998) and affective (Murphy & Zajonc, 1993; Zajonc, 2000) processes – maybe even the majority of such processing – take place outside the individual's awareness. In accordance with these findings, the proposed RD framework assumes that at least a certain degree of affective and cognitive processing of environmental information does take place outside of the perceiver's awareness, thus representing tendencies and not experiences. The degree to which individuals become aware of their physical surroundings is hereby dependent on the interplay between distal aspects (i.e. ESF content) and proximal variables (i.e. relevances and general attentiveness).

It is also assumed that *all* the environmental information, which is being received by the sensory apparatus, is continuously being processed, either with or without the perceiver's awareness. This stands in contrast to a number of cognitive theories of perception, which maintain that only a fraction of the available information is being processed and that irrelevant information is being filtered out (Treisman, 1964; 1992; Treisman & Gelade, 1980 all cited in Matlin, 1998). The view on this matter, as espoused in the RD framework, is that the "filtering" process itself can and should be viewed as an early, but integral part of the perceiver's sensory information processing. After all, a decision as to what content will be further processed and what sensory information has to be discarded represents an active mechanism in itself and should not be confused with receptor cells' inability to sustain its function when faced with a continuous stimulus. Sensory adaptation is a passive bio-electrochemical limitation of the sensory apparatus (Coren & Ward & Enns, 1994) due to exhaustion of certain chemicals while the filtering of information is an active process. Filtering, in this context, is viewed as a

mechanism leading to the perceiver's becoming aware of some content of sensory information but not of others.

The perceiver's Environmental Awareness Continuum (EAC) is conceptualised as the internal mental arena in which the entirety of processed sensory information is being located. Because what is being registered via the sensory apparatus, and what the perceiver is aware of usually does differ substantially, the EAC encompasses a region of awareness of sensory information and a region of unawareness of sensory information. In other words, the sum total of what is being accessed from the surrounding space-time by the perceiver's sensory apparatus is congruent with the sum total of what is being processed with or without the perceiver's awareness (i.e. the ESF content is equivalent to that of the EAC). The ESF and the EAC as a whole are seen as always completely congruent components of the perceptual individual-environment system. They represent the distal and proximal aspects of this system respectively. As a corollary, the ESF and the EAC region of awareness normally are not congruent (i.e. the ESF content is not equivalent to that of the EAC awareness region). It is proposed that the entirety of a perceiver's ESF is *continuously* being processed within either of the two regions of awareness and unawareness of the perceiver's EAC.

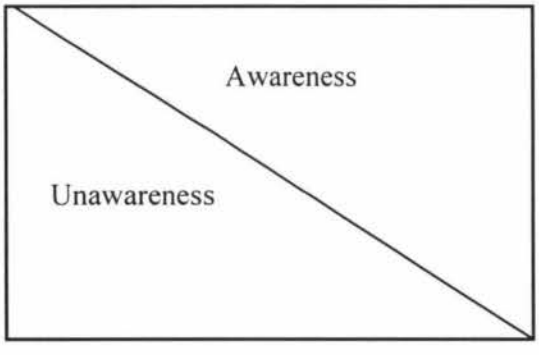

Figure 24: Environmental Awareness Continuum, encompassing a region of unawareness and a region of awareness.

The EAC is thought to represent a part of the entirety of an individual's set of cognitions and affect. That is, the processing of perceptual information is not seen as taking place completely autonomously. It is certainly intertwined with memory, language, mental imagery, problem solving, decision making, planning and so

forth. As has been outlined in the chapter on resonance and dissonance, the results of perceptual processes are thought to influence other areas of cognition, behaviour, physiology and affect in correspondence with the five-part model of psycho-physiological functioning.

Various influences can lead to changes in the proportion of awareness to unawareness within the EAC. That means, that there might be anxiety-provoking circumstances, such as working under the gaze of a supervisor, or relaxing circumstances, such as undisturbed daydreaming, which are more or less conducive to a conscious experience of one's physical surroundings. In other words, the regions of awareness and unawareness are not a fixed quantity but their boundaries shift according to the individual's general psycho-physiological state. Interindividual differences in regard to the proportion of awareness to unawareness due to personality traits also exist. For example, persons high on trait anxiety (Spielberger, 1985) are more vigilant in general. Therefore, an element, which may go unnoticed by a low anxiety individual, could be located in the awareness region of an anxious person.

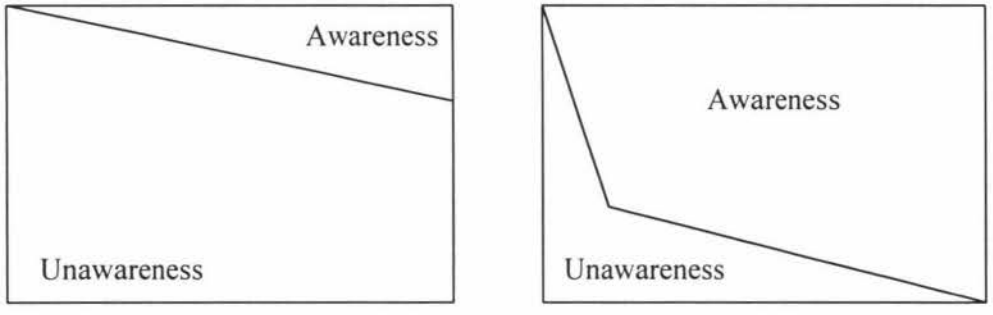

Figure 25: Variation in the proportion of the regions of awareness and unawareness due to context.

In summary, an individual's Environmental Awareness Continuum is conceived to encompass a region of awareness, which refers to that part of space-time, which is being accessed via the sensory apparatus, and of which the perceiver is conscious of. The EAC also includes a region of unawareness, which refers to that part of space-time, which is being accessed by the perceiver's sensory apparatus, but of

which they are not being conscious. The combined regions of awareness and unawareness are *always* completely congruent with the perceiver's ESF.

Under normal circumstances, a perceiver will never be entirely unaware of their ESF nor be aware of their whole ESF. Some environmental elements enter the perceiver's consciousness, while others are registered by the sensory apparatus but remain on an unconscious level of cognitive and affective processing. That is, some elements are more salient to the perceiver than others.

A hallmark of the EAC concept is the notion that specific elements can shift in and out of the awareness region. For reasons, which will be explained, some aspects of the environment are salient and others are not; and for some their salience changes over time. Perceptual habituation, therefore, is seen as a process of gradual transfer of sensory information, which used to be salient, from the awareness to the unawareness region of the perceiver's EAC. For example, the regular clicking sound of a mechanical clock, or the sound of rushing water from a nearby river, are examples of auditory elements, which are quite readily noted by someone, who is exposed to them for the first time. However, after some time of continuous exposure, these elements seem to 'fade out' of the perceiver's awareness to the point, that they do not appear to exist anymore at all. Of course, the airwaves are still being received and transducted and encoded by the individual's sensory apparatus (Coren, Ward & Enns, 1994). Yet, these processes are no longer leading to a conscious experience of the element. In other words, the sound of the clock or rushing water (i.e. auditory element) has shifted from the awareness region to the unawareness region of the perceiver's EAC. However, any change in the basic features of these elements such as pitch, timbre or loudness is also very likely to lead to their, at least temporary, return into the EAC awareness region. A substantial proportion of the available perceptual information remains within or shifts into the unawareness region of an individual's EAC. That means that a significant amount of information about an individual's physical surroundings is never going to enter their consciousness or will fade from it under particular circumstances.

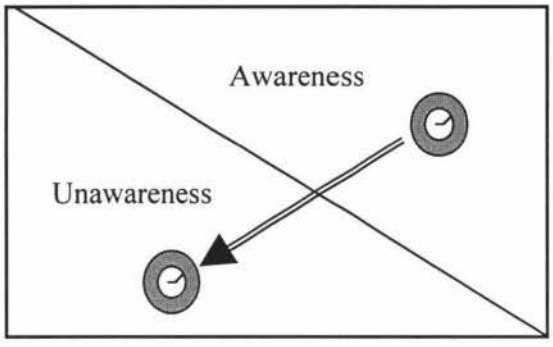

Figure 26: Example of habituation, as sound of clock shifts from region of awareness to that of unawareness.

Which particular ESF elements the perceiver becomes aware of and which remain in unawareness depends on a number of factors. The most fundamental factor is that of an element being different from other elements around it. As explained earlier, camouflage can turn objectively distinct elements into features of other and bigger elements. Certain moth species or stick insects, for example, possess shape and colour features, which allow them to blend seamlessly into their context of bark or branches, and leaves. In this case, they do not exist as identifiable visual elements in themselves but have assumed the perceptual status of a small feature of another visual element such as a tree. Even though an individual may be looking at them, chances are that they will not be located within this perceiver's awareness region as independent elements.

Psychophysical research has determined the perceptual limits of distinctiveness (Coren & Ward & Enns, 1994). Concepts derived from this area of research such as the "perceptual threshold" (Fechner, 1966) and the "just noticeable difference" (Weber, 1834 cited in Coren & Ward & Enns, 1994) play a role in the formulation of the theory of the Environmental Sensory Field and the Environmental Awareness Continuum, in so far as they provide the limits of what can be defined as an environmental element and, therefore, of the content of a perceiver's EAC. Gestalt psychology's concepts such as 'the figure-ground-phenomenon' and related laws about visual perception represent another theoretical pillar on which the proposed

theories as part of the proposed RD framework rests as they, too, provide guiding principles as to how visual elements are mentally represented in the perceiver.

However, as has been emphasised before, the focus of the proposed theoretical framework rests on the relationship between an individual and their physical surroundings and not on the neurological-cognitive processes which enable humans to perceive coherent sounds, objects, odours, and surfaces. These latter phenomena are regarded as a given with which the perceiver enters into a relationship, based on a particular set of expectations. In other words, environmental elements are seen as the raw material of environmental appraisal processes, simply because we are able to perceive them this way.

As outlined in previous chapters, the proposed RD framework holds that an environmental element's importance for the perceiver will be appraised both cognitively and affectively. Innate and cultural relevances may or may not match with the environment and affective and cognitive resonance or dissonance tendencies will emerge correspondingly. In respect to the EAC model of sensory information processing, it is assumed that elements, which do lead to strong cognitive resonance or dissonance tendencies, are more likely to be noticed by the perceiver, thus turning into a conscious experience. Meanwhile, only extreme affective resonance or dissonance is thought to bring an element into the perceiver's awareness.

As outlined earlier, any number of cultural relevances can relate an element to the perceiver. These cultural relevances can be of a complimentary or a contradictory nature. Furthermore, it is postulated that each cultural relevance, as part of a network-like structure, does possess a specific weight in the appraisal process, and that this weight actually is context dependent. For instance, an individual's quick look at her watch will either momentarily activate the perceiver's usefulness relevance, or the glance itself was motivated by the already active relevances. If the watch is not broken, a resonance tendency will emerge, which is based on the match between the perceiver's expectation to learn the exact time of day and the

device's agency to deliver this information. For one brief moment, the watch will be within the perceiver's awareness region of her EAC because of relevances, which have become very strong. Before the urge to learn about the time and afterwards – particularly if the wearer of the watch is busy – the watch might also have been an element of her visual ESF sub-field. Yet, as the pertinent relevances are not activated during these periods, no resonance or dissonance tendencies emerge, as the device is actually irrelevant at this point in time, and the watch's presence will possibly remain unnoticed.

If other persons were present and the perceiver held strong ideas and beliefs around issues of being important and popular, other cultural relevances relating to prestigiousness, desirability, monetary value, beauty, popularity of the wearer of such watches as suggested in a recent media campaign, and so forth, the watch would be appraised in terms of these relevances. If the watch indeed was able to fulfil the perceiver's particular expectations, such as inducing people to make comments about it, potential sexual partners starting to act flirtatious after having seen it, and so forth, a strong cognitive resonance tendency would emerge, which would keep the watch within the perceiver's EAC awareness region. On the other hand, cognitive dissonance will occur if the watch does not have the agency to fulfil these expectations in this context. Resonance or dissonance leads to the same effect in respect to this particular element's position within the individual's EAC. The object will be noticed.

In summary, the match or mismatch of an environmental element with cultural relevances is a determinant of the importance of this element for the perceiver. The degree of importance, then, manifests itself in terms of the intensity of the emerging resonance or dissonance tendencies. That is, the stronger a particular relevance is relative to other relevances and the more the element does match or mismatch, the more the perceiver's cognitive and affective relationship with this environmental element will be determined by this relevance. The stronger the cognitive and affective relationship between the perceiver and an element is, the more likely it becomes, that the individual will be aware of this particular element.

Relational intensity

Notwithstanding the importance of cultural relevances for the process of appraising environmental elements and locating their position within a perceiver's EAC, the additional dimension of the element's relational intensity is proposed as a factor that has to be taken into account, also. In general terms the concept of relational intensity refers to the subjective experience of a perceiver that a particular element might physically impact on him.

Objects can be physically far away, thus located towards the periphery of a perceiver's ESF visual sub-field, or they can be close to him. The closer an element is located relative to a perceiver, the greater is the probability of it physically impacting on the perceiver. Elements, which are close to the perceiver, therefore, assume a greater relational intensity (Patsfall, Feimer, Buhyoff & Wellman, 1984) than those, which are farther away. Another important distinction is that between stationary and moving elements. Moving elements assume a greater intensity than stationary elements, because moving elements are more likely to make a direct impact on the perceiver than stationary ones. And, within the category of moving elements, those, which are moving towards the perceiver assume a greater intensity than those, which are moving away. Thus, a three dimensional relational intensity matrix along the parameters proximity, locomotion, and trajectory can be constructed.

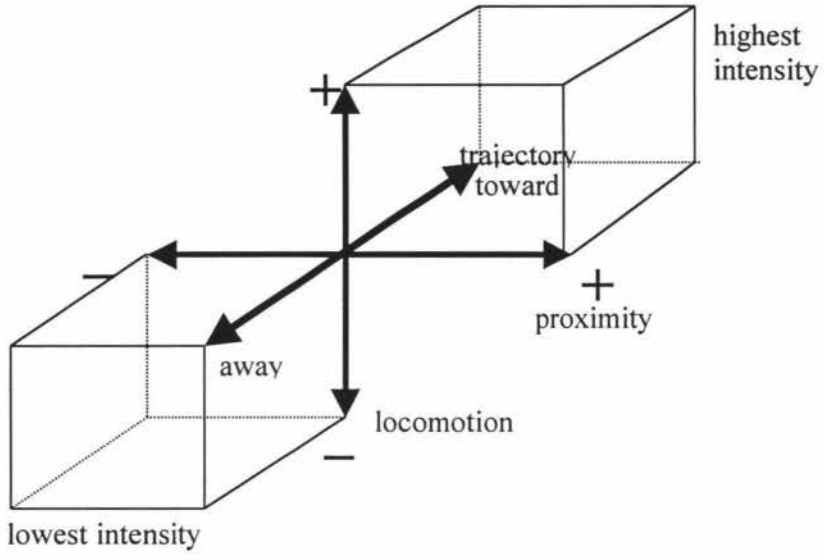

Figure 27: Three dimensional relational intensity space created by proximity, locomotion and trajectory. The area of the lowest intensity encompasses elements, which are far away and stationary. The area of highest intensity encompasses elements, which are close and moving towards the perceiver.

Walking across a road provides an excellent illustration of the concept of relational intensity. If one stands at the kerbside, vehicles, which are parked along the road, are probably not arousing one's interest very much. And those, which are parked a few hundred meters away, will probably attract the perceiver's attention even less. Any moving vehicle, however, is much more likely to be registered consciously, and those cars, which approach the perceiver's position, will assume a higher priority than those, which are driving away.

Environmental elements are, therefore, conceived to be automatically categorised in terms of their potential to physically impact on the individual. Such a categorisation process is of great adaptive value because it allows the individual to make a quick judgement about the potential dangerousness of an element. This judgement is not dependent on recognition of the element as it is based solely on its position, locomotion and trajectory. It is as relevant for contemporary elements such as cars and trucks as it was for mammoths, sabre-toothed tigers or falling rocks.

As outlined in the preceding chapter, different sensory modalities tap into different aspects of an individual's surroundings. In terms of these different

sensory modalities, then, 'being closer' to the perceiver means not only being physically nearby, as in the case of visual elements (i.e. solid objects), but also exerting a greater impact on the individual's sensory apparatus. In respect to olfactory and auditory information this means that, everything else being equal, the stronger the odour and the louder the sound becomes, the closer the source of this information is. The relational intensity of an olfactory and auditory sensory element, therefore, points to the location of its respective source relative to the perceiver.

This inference, of course, is only accurate if there is no variation in the generation of the sound or odour. If a sound or an odour becomes stronger as, for example, is the case in a developing house fire, it may not be the source's location but the "strength" of the element that is changing. Here, strength can technically be defined as concentration of odour carrying molecules per cubic meter (i.e. parts per billion, ppb) or sound pressure (i.e. decibel). In either case, an increase of intensity points to an increase in the impact of the element on the perceiver. Tactile and gustatory information actually represent special cases as the source of the sensory information has to impact on the perceiver's body directly. Their relational intensity, therefore, is of a rather binary nature. That is, taste or feel is either present or not.

Within each sensory modality, the mentioned principles of relational intensity apply. That is, elements exerting only a weak physical impact on receptor cells (i.e. far away or weak source) are of a lesser psychological intensity than elements with a stronger impact (i.e. close by or strong source). Elements, that move or change their strength, are of greater intensity than unchanging ones. And elements, which move closer or increase their strength, have the greatest intensity. As has been explained in the chapter on the ESF, camouflage techniques can lead to a situation whereby objectively distinct elements blend into other elements. The relational intensity of such hidden elements will therefore be zero until the perceiver is able to discern them. As camouflage techniques are usually applied either by predators or prey, the relational intensity will immediately be quite strong in cases, where

the element's true identity is eventually revealed, as the element will be close by and probably moving very fast.

It needs to be emphasised that the concept of relational intensity in the framework of the proposed RD model of *perception* pertains to the level of the actual physical impact of the respective element on the perceiver. That is, elements, which are not physically present in the individual's current ESF have a relational intensity of zero, even though they might be the object of intense cognition and affect, because the individual is remembering or imagining them. For example, lying in bed and fantasising about driving a red Italian sports car does not pertain to the proposed RD framework as no such object is actually present in the dreamer's bedroom.

The same applies to elements of which presence within his ESF boundaries the perceiver is cognisant but is unable to actually perceive them. For example, soldiers on a battlefield, who know about enemy forces in their immediate surroundings, because they have been told about them in a briefing prior to their engagement, but are unable to see or hear or smell them, due to the enemy's hiding tactics, find themselves in a very difficult situation. For as long as the enemy soldiers and their weaponry cannot be perceived they remain outside the soldier's ESF. Yet, it can be quite dominant in their cognitions and related affect. And it can be surmised that the very instant, such dangerous elements become a discernible part of the soldier's ESF, their match with high priority relevances as well as their relational intensity will be extremely high.

In summary, it is proposed, that environmental elements vary in terms of their relational intensity in correspondence with their location, locomotion, and trajectory relative to the perceiver. Elements with a high relational intensity are thought to have a greater probability to be placed in the awareness region of the perceiver's EAC than elements with a low relational intensity.

Interplay between cultural relevance and relational intensity

In applying the concepts of cultural relevances and relational intensity, a two dimensional matrix can now be constructed, which allows us to predict a particular environmental element's momentary position within the perceiver's EAC in terms of each particular relevance. As outlined, the dimension of relational intensity represents hereby a composite of three dimensions (i.e. position locomotion, and trajectory), which have been collapsed into one.

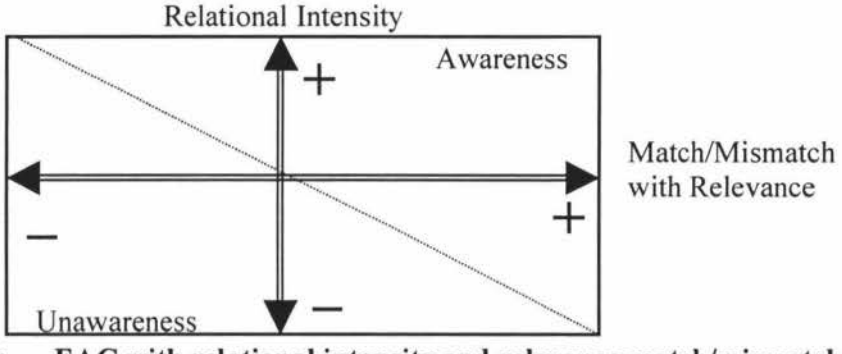

Figure 28: EAC with relational intensity and relevance match/mismatch grid superimposed.

It is postulated that an element, which does strongly match or mismatch with a particular relevance and, which possesses a high relational intensity, is more likely to be located within the awareness region of the perceiver's EAC than elements low on both dimensions. As these are continua, any location between the extremes is possible. Secondly, the relative strength of the relevance within the perceiver's relevance network has a decisive influence on the position of the element within the EAC. Any changes on those dimensions will result in a shift of the element's position within the perceiver's EAC.

The encounter of a car enthusiast with an Italian sports car and an old Japanese car on the streets of Auckland can serve as an illustration of this process. The Italian sports car matches with a number of cultural relevances possessing a high rank within this individual's relevances network. In fact, this object is so relevant to the perceiver that it will be present in his EAC awareness region the very moment it enters his ESF. The sports car can be seen behind a lively intersection coming towards the perceiver. Other cars around the car, which the enthusiast is driving

himself, are quickly fading into his EAC's unawareness region as he is approaching the intersection and the Italian sports car is coming closer, thus assuming a position of highest possible awareness within this perceiver's EAC. So enchanted is the perceiver that he fails to notice the red traffic light in front of him and he enters the intersection.

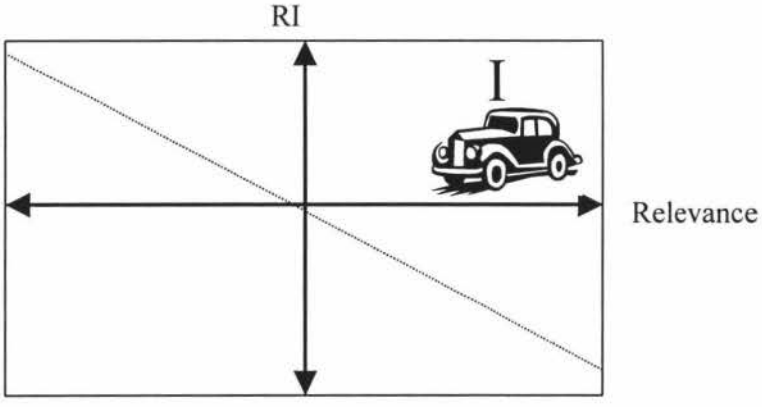

Figure 29: Position of Italian (I) sports car within individual's EAC, in terms of its relational intensity and match/mismatch with cultural desirability relevance.

Unfortunately, at the same time a small and old car of Japanese origin, which does not match any of the individual's pertinent activated cultural relevances at all, enters the intersection, coming from the right. It is only a few split seconds before the imminent crash between the perceiver's car and the Japanese car that this element's position (i.e. awfully close), locomotion (i.e. moving fast), and trajectory (i.e. towards the perceiver's car) create a relational intensity strong enough to override the element's lack of relevance in terms of prestigiousness and desirability, thus bringing this element into his awareness region. The, initially in the unawareness region placed, element now momentarily assumes a position of highest awareness as the impact is taking place. At the same time, the Italian sports car has quickly faded into the unawareness region of the perceiver's EAC, as the Japanese car's relational intensity has reached a maximum at the moment of the impact.

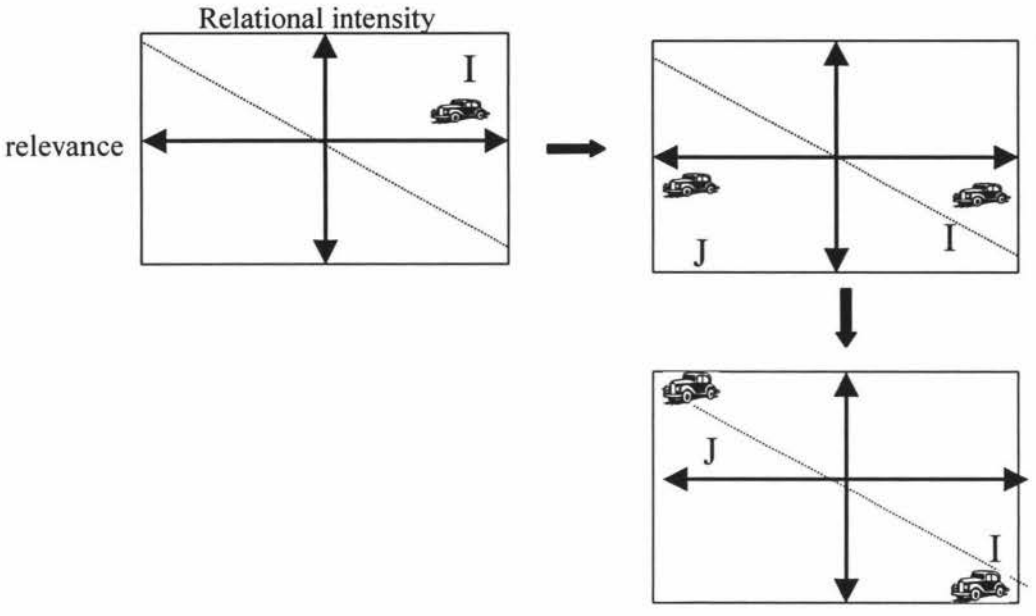

Figure 30: Successive positions of the Italian sports car (I) and Japanese car (J) within the driver's EAC in respect to their relational intensity and match/mismatch with prestigiousness relevance.

At the same time, other relevances such as death, pain, and injury have been activated and replaced those bringing and holding the Italian sports car within the accident victim's awareness region until a few seconds ago. In other words, active cultural relevances directed at the element and its relational intensity combine to position it within or outside a perceiver's awareness at any given moment in time. Each relevance–relational intensity matrix encompasses a perceiver's whole EAC within which an element's temporary location, in respect to *this particular type* of relevance, can be predicted. Yet, as has been outlined earlier, any number of different relevances may be simultaneously applied to an element. Thus a multidimensional EAC space incorporating a multitude of overlapping relevance/relational intensity matrix locations for each element does exist. These overlapping relevance/relational intensity matrices vary also in their relative weight in correspondence with the perceiver's personality and contextual factors.

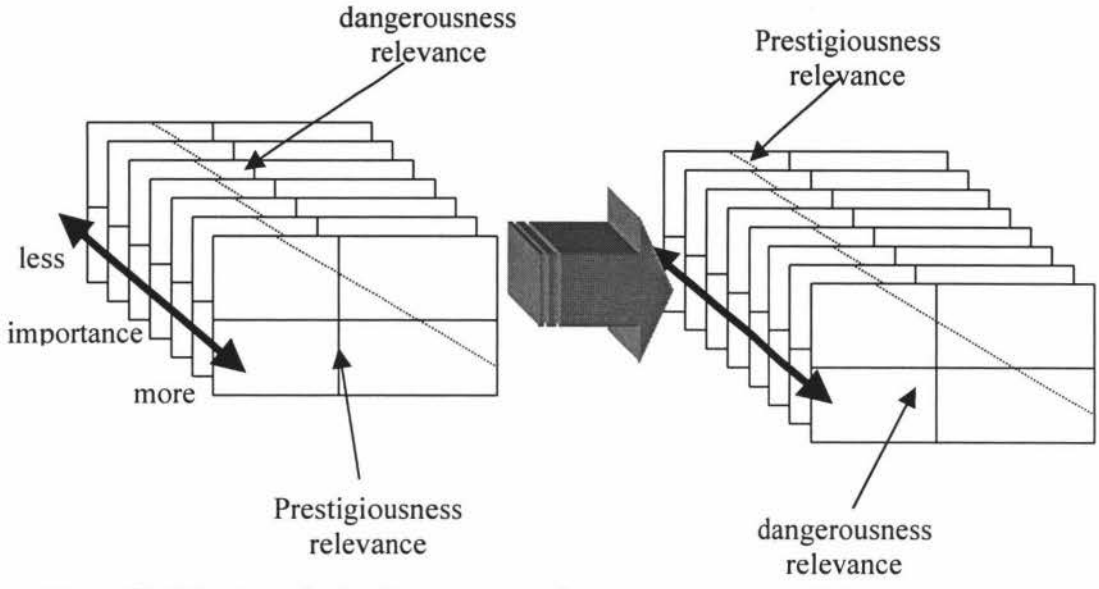

Figure 31: Shift in the relative importance of prestigiousness and dangerousness relevances within the set of cultural relevances held by the perceiver.

It becomes clear, that the appraisal process, which is underlying a perceiver's awareness or unawareness of environmental elements, does encompass a myriad of ever-changing variables. These variables are highly interdependent and their influence on each other is of a rather non-linear nature. Simplifying concepts of linear causal relationships between a single element's features and the perceiver's awareness are not sufficient to capture the dynamic of a system of such complexity. It might therefore be more appropriate to borrow from concepts of non-linear dynamics (Abraham & Gilgen, 1995) and think of the awareness and unawareness regions of the EAC as pulling forces (i.e. attractors) between which the respective element is moving back and forth. That is, factors such as contextually determined activation of cultural relevances, their respective relative strength and the ensuing resonance or dissonance tendencies combine to pull the element's mental representation towards one of the attractors. Rather than to speak about an element's momentary position within the EAC it is therefore more befitting to speak of its trajectory over time.

Influence of innate relevances

So far, the processes leading to the positioning of an element within the perceiver's EAC having been discussed exclusively in terms of cultural relevances. Innate relevances of which primary effect is affective resonance or dissonance, however,

are also thought to play a role in this process. The sub-cortical affective appraisal system, to which the term innate relevances refers, operates outside the perceiver's awareness. That is, strong affective resonance or dissonance on the basis of an element's phylogenetically determined familiarity, dangerousness, nourishingness, pleasantness, affordance, and so forth, is thought to have a directing influence on the activation of cultural relevances and corresponding cognitive RD tendencies.

If, for example, the Japanese car was of a particularly bright neon colour, it is thought to represent a strong mismatch with the perceiver's innate familiarity relevance, thus leading to the automatic categorisation of this element as potentially dangerous. Depending on the strength of this affective dissonance tendency, relative to other concurrent resonance or dissonance tendencies, based on the remainder of the ESF content, an activation of cultural relevances and the positioning of the car within the EAC awareness region might occur.

Again, the context, in which the element-perceiver contact takes place, needs to be taken into account. If the shining neon coloured car is part of an ESF, which is saturated with such artificial elements and features, such as an inner city urban context, where billboards, cars, colourful shop fronts, and so forth, dominate, the fact that it represents a mismatch with the perceiver's innate familiarity relevance will not be likely to draw the individual's attention to it, because it would blend seamlessly into the artificial context. Here, the car would become just another facet of a physical surroundings, which is leading to environmental alienation. In contrast, the same car on a rural intersection surrounded by paddocks, bushes and trees will stand out quite readily in the context of an ESF dominated by natural elements. Conversely, isolated natural features, such as trees, within an artificial context, such as an inner city scene, should lead to a stronger contrast effect, than the juxtaposition of other, structurally similar, artificial elements such as power poles.

In other words, it is proposed, that isolated elements within an ESF context of predominantly contrasting character (i.e. natural or artificial) will lead to a

stronger affective tendency than the same elements within a congruent ESF context. Such isolated elements represent "islands of resonance or dissonance" in a field of the opposite character. They are, therefore, more likely to draw the perceiver's attention to them. That is, the strong affective resonance or dissonance tendency, which is linked to such contrasting elements, and which might assume the character of a fully fledged emotional experience, is thought to increase the probability of an activation of cultural relevances, which in turn increases the likelihood of these elements as being located within the awareness region of the EAC.

In evolutionary terms, such a mechanism would represent an efficient early warning system, which would be very adaptive as it enables the individual to become immediately aware of unusual, and therefore potentially dangerous, elements. It is also an economical mechanism as subsequent cognitive-affective-physiological-behavioural patterns are primed without taking up limited attentional capacity.

In summary, it is proposed that the mental arena, in which the encounter between the individual's ESF content and their relevances takes place, is the Environmental Awareness Continuum (EAC). This continuum can be divided into a region of awareness and a region of unawareness. *All* the sensory information, which is accessed by the individual (i.e. the entire content of the ESF), is processed in either one of these regions. The momentary location of specific environmental elements in one or the other region depends on the relative strength of activated cultural relevances, the degree to which the element does match or mismatch with them, as well as the element's relational intensity. Extreme relational intensity will shift even the most irrelevant elements into the perceiver's awareness. Conversely, relevant elements will fade into the unawareness region of the EAC if they are located at the periphery of the ESF or if prolonged exposure to them occurs. Furthermore, the proportion of awareness to unawareness within the EAC is not fixed but changes itself as a result of changes in the individual's psycho-physiological state. Innate relevances are not thought usually to shift single

elements into the perceiver's awareness region. Nevertheless, it is hypothesised that elements, which are in stark contrast to their context in terms of innate relevance properties, will be more likely to arouse the perceiver's attention, thus be shifted into the EAC awareness region.

With the presentation of the Environmental Awareness Continuum, which includes the notion of relational intensity, the series of interlocking concepts, which together constitute the RD framework, is in place. The nature and function of proximal and distal aspects in the process of environmental appraisal, the affective and cognitive immediate outcome of this process as well as subsequent psycho-physiological sequelae have been outlined. In the following chapter it will be outlined how the proposed RD framework can integrate existing theories of environmental preference and restoration. Furthermore, it will be demonstrated how the proposed RD framework provides a conceptual link between different sub-fields of psychology. Etiological concepts in the sub-field of clinical psychology, in particular, will be conceptually linked to the proposed theoretical framework.

Why do we care? — Theoretical Integration

In the preceding chapters the various interlocking components of the perceiver-environment system have been developed. These are the concept of affective and cognitive resonance and dissonance and their corresponding psycho-physiological sequelae, the theory of relevances, the theory of the Environmental Sensory Field, and the theory of the Environmental Awareness Continuum including relational intensity. Together, these components constitute the proposed RD framework of environmental perception.

In the introductory chapter the claim was made that the proposed theoretical framework has the conceptual power to integrate a number of existing theories in the field of environmental psychology. The targeted theories in this psychological sub-field pertain firstly to the persistent tendency of people to prefer representations of nature over those of urban character. Secondly, theories about the restorative effect of nature on humans will be integrated into the proposed framework, too. The proposed RD framework will also be utilised to create a conceptual link to etiological theories of anxiety and other mental disorders within the sub-field of clinical psychology. Links to other psychological sub-fields such as social psychology or industrial/organisational psychology are certainly possible but in the context of this thesis, the emphasis rests on the relevance of the proposed framework for clinical issues. Therefore, this is the appropriate place to revisit the components of the RD framework, to assemble them, and to demonstrate how existing research and theories slot into the envisaged model of the relationship between the perceiver and her physical environment.

In its essence, the proposed theoretical framework represents a substantial extension of the traditional "five-part model" of psycho-physiological functioning

(see figure 4), which was originally developed within the cognitive school of thought of psychotherapy. However, the RD framework goes beyond the assertion that cognition, affect, physiology, and behaviour, within a certain situation, are interlinked. This is achieved by specifying the conditions and processes, which link the individual to his current physical surroundings and by specifying the internal and external feedback loops arising out of this encounter.

In going beyond the original five-part model, the ways in which the various aspects of an individual's psycho-physiological functioning are connected with the current situation can be specified as shown in figure 5. The physical environment – via perception processes – does impact on the individual's cognitions, affect, and behaviour. Through the provision of oxygen, nutrients, toxins, mechanical force, and so forth, the individual's physiology is also being impacted on by the environment. The initial effects of all those impacting factors will spread to all other parts of psycho-physiological functioning. Meanwhile, the individual is also impacting on the situation through his or her behaviour and physiological functions. The latter aspect refers to the body's excretion of gases, solids, and fluids, production of noises, provision of touchable surfaces as well as altering the spatial configuration of the environment.

In the context of the proposed RD framework, the situation, in which the individual is embedded is conceptualised as the Environmental Sensory Field (ESF), as shown in figure 23. Any element, which could impact on the perceiver and which is accessible through his sensory apparatus is contained in the ESF. As has been explained, elements such as radioactive radiation, which cannot be sensed by the individual, cannot be a part of his ESF. Such elements are still relevant for the individual in regard to their effects on his physiology, and, therefore, for his psycho-physiological functioning in the long run. However, the RD framework is targeting the currently accessible environment and the perceiver's relationship with it only.

The major tenet of the proposed RD framework is the notion, that innate and cultural relevances provide the individual with a mental yardstick in order to appraise her environment in terms of adaptational and cultural needs and wants. While innate relevances are genetically determined, cultural relevances are influenced by a variety of factors, as shown in figure 13. The encounter of innate relevances and the environment does lead to a shift between a positive or negative affective frame, while the match or mismatch between cultural relevances and the environment does lead to the emergence of cognitive resonance or dissonance. These processes link the individual affectively and cognitively to her current physical environment.

It is proposed that the initial global affect or cognitive tendency emerging out of the encounter between the individual and the environment will eventually influence all psycho-physiological functioning. That is, as far as cognitive, behavioural, and physiological sequelae are concerned, feedback loops to the ESF as well as to cultural relevances do exist. Dissonance or resonance experiences can be motivating factors for individuals to maintain or alter their ESF, their cultural relevances, or both.

Figure 32 is a graphic representation of the complete RD framework. Its components such as the ESF, and the factors determining its content, the perceiver and her innate and cultural relevances, and the factors determining them, are depicted. The underlying affective frame, cognitive resonance and dissonance emerging from the encounter of relevances and ESF, and the perceiver's interlinked cognitions, emotions, physiology and behaviour are a central part of the figure. Feedback loops from the perceiver's psycho-physiological functions to the factors determining the ESF and relevances, respectively are shown, as is the interconnection between these factors.

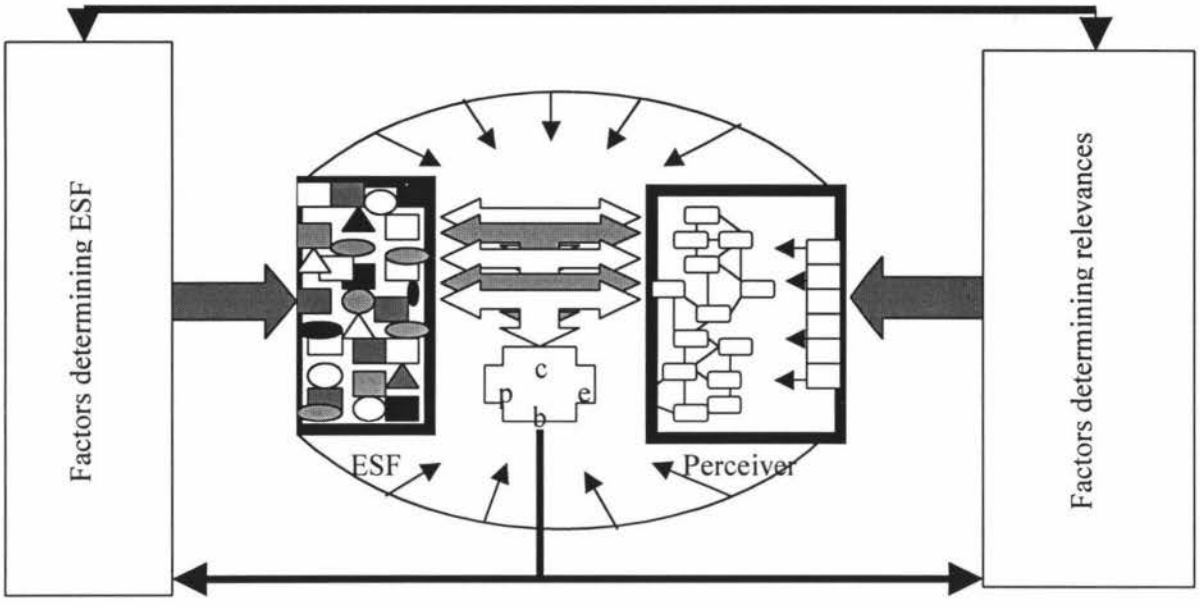

Figure 32: Complete RD framework

Preference judgements between natural versus urban environments

The question, which kind of environment is being preferred by humans, and the cause of their judgement call has been one of the major targets of research in environmental psychology. Firstly, the consistent tendency to prefer natural landscapes over those of urban character emerged as a pivotal finding (Daniel, 1990; Kaplan, Kaplan & Wendt, 1972; Parsons, 1991; Purcell, Lamb, Peron & Falchero, 1994). Secondly, another line of theorising and research has been concerned with preference judgements between variations of natural environments (Parsons, 1991).

Theoretical approaches, which locate the cause of human preference judgements within the content of the environment, have emerged (e.g. empirical aesthetics approach by Berlyne, 1970). Common to these approaches is the assumption that certain stimuli constellations lead to an optimal physiological arousal state, which is experienced as preferable. In espousing a formalistic approach (Carlson, 1977; 1984), environmental characteristics, such as uncertainty, are thought to be the cause for the optimal arousal in the perceiver. This attempt, to quantify environmental variables in order to derive an algorithm (Shafer, Hamilton & Schmidt, 1969; Daniel, 1990), which can be used to predict preference judgements,

has been criticised. Contentious points are the imprecision as to what is being quantified (Carlson, 1977) as well as the fact that such a methodology inevitably reduces the richness of the original multi-modal situation (Ittelson, 1973) to an inappropriate low-dimensional formalism.

An evolutionary theory of environmental preference has been put forward by Orians (1980; 1986). He asserts that humans display a preference for savannah-like landscapes, which have sustained early humanoid and human ancestors. In a similar vein, Kaplan and Kaplan's (1989) evolutionary-cognitive concept emphasises the perceiver's need to explore and to understand their physical surroundings as the key variables in determining preference. The environment must provide an informational balance; that is, it needs to be interesting, but not overwhelming, and structured, but not boring, in order to be preferred. In this approach, content categories are used to predict preference (Herzog, 1985; 1989; 1992; Kaplan & Kaplan, 1989). Appleton (1988) claims that the agency of the environment to provide prospect and refuge to the perceiver is crucial for a preference judgement. That is, another evolutionary-developed need, to be able to observe one's environment without being seen by others, is proposed to guide one's preference judgement. In general, evolutionary theories of environmental preference are built on the assumption that preferring environments, in which the perceiver's species can thrive, are adaptive (Kaplan, 1992). Zajonc (1980) modified and expanded these evolutionary theories by introducing the notion that preference judgements are not the outcome of purely cognitive processes but are based on a pre-conscious affective appraisal. In Zajonc's rather vague terms, nature is providing 'preferenda', that is some sort of gross features, which lead to the liking effect.

All these approaches can be integrated into the proposed RD framework. Appleton's as well as the Kaplans' concepts are conceived to represent innate relevances applied to the ESF. The opportunity to see but not to be seen and the desire to explore and understand one's environment are not mutually exclusive but represent a cluster of adaptational needs in relation to spatial configurations of

environmental elements. Certain configurations are conducive to explorative behaviour (Ittelson, 1973). Thus, these transcend simple notions of perception as two-dimensional visual input processing. The RD framework allows for the integration of such needs in the form of innate relevances. Prospect, refuge, mystery, and legibility relevances contribute to the emergence of affective resonance if the spatial configuration of the physical surroundings matches with them. The emerging positive affect, then, is conceived to exert a directing influence on any conscious preference judgement. The mentioned arousal theories are integrated into the proposed framework, in that physiological arousal is one aspect of the five-part model of psycho-physiological sequelae, which are associated with the individual-environment encounter.

It has been pointed out before that the underlying positive or negative affective tendencies associated with certain types of physical surroundings represent a crucial component of the proposed RD framework. The main line of argument is that natural landscapes represent an ESF, which matches with a perceiver's innate relevance of familiarity. In this case, an underlying affective resonance, which is emerging from the perception of the environment as generally non-threatening, is providing the frame within which the encounter between the perceiver's cultural relevances and the respective ESF elements is taking place. In the case of environmental affinity, any cognitive judgement about the specific current environment is being made in the presence of an affective "halo effect". This means that a positive affective stance towards natural environments will colour and influence any cognitively-based decision process. This positive affective priming of cognitive processes leading to a preference judgement could be described as the result of a phylogenetic long-term mere-exposure-effect. That is, in analogy to research findings that images or objects, to which one has been exposed before, seem to be liked more than novel alternatives (Bornstein, 1989), environments, to which our ancestors have been frequently exposed during human phylogenesis (i.e. nature) seem automatically to be liked more than novel (i.e. urban) environments.

Incidentally, the concept of 'nature' in the context of the proposed RD framework does not necessarily include landscapes and elements such as agricultural and horticultural areas or formal park settings, which are commonly regarded as 'natural'. This is because the innate familiarity relevance is conceived as applied to the whole of the ESF. While plants and soil, as natural elements in themselves, dominate agricultural and horticultural areas as well as parks, they are often arranged in very artificial regular and geometric patterns (Wohlwill, 1983). Such large-scale patterns deviate strongly from naturally occurring landscapes marked by irregularity and diversity. These large patterns do not match with the phylogenetic familiarity relevance, thus leading to affective dissonance tendencies despite the natural properties of the specific elements (i.e. plants), which constitute the overall pattern. The same applies, of course, even more to contemporary urban sceneries and interior spaces, which are completely dominated by artefacts.

However, the ultimate outcome of the decision making process in terms of preference judgements, also depends heavily on cultural relevances (Hull & Revell, 1989). For example, the cognitive resonance stemming from the match between an urban landscape, which contains cues of prosperity and high status, with cultural relevances of prestigiousness and desirability might therefore swing the decision of the perceiver in their favour over a rugged looking wilderness. On the other hand, perceivers with an agricultural background might base their decision on other cultural relevances such as accessibility, soil fertility, and utility, which can be applied to natural landscapes. Again, real estate agents and land developers might judge the natural landscape along cultural relevances around developing potential, profitability, and so forth. Age related differences (Zube, Pitt & Evans, 1983) are also to be expected. Adolescent test subjects, for example, are likely to employ cultural relevances around opportunity for physical action, excitement, and so forth. For them, a natural landscape might appear rather dull and boring on the grounds of their specific culturally and developmentally determined set of cultural relevances (Bernaldez, Gallardo & Abello, 1987).

And of course, this is not to say, that nature in itself cannot be dangerous and threatening to the individual, thus being less preferred. Falling into a white water stream, being attacked by a lion, or sinking into a quicksand hole are serious and life threatening situations. Yet, even in such dramatic circumstances, the fundamental underlying relationship between perceivers and their environment as a whole remains one of affinity, as the general setting is phylogenetically familiar. The consciously experienced negative cognitions and emotions in the face of the particular threat by specific environmental elements are based on the concurrent match between the environment and pertinent cultural relevances.

Anxiety research suggests, that dangerousness as another innate relevance matches with certain environmental features such as snakes, spiders, and heights (Öhmann, 1970; 1993). The resulting affective dissonance tendency quite possibly "overrides" the fundamental affective resonance based on phylogenetic familiarity. It is very likely that in such a situation of immediate danger the individual's conscious preference judgement would be strongly guided by the specific cognitive and affective dissonance tendencies and not by the underlying affective resonance frame. For example, if someone had to choose between a potentially life threatening situation in a wilderness setting and a non-threatening situation in an urban setting all but the staunchest thrill seekers could be expected to prefer the urban setting. If however, the salient threat is removed, the outcome should be reversed.

In other words, it is assumed, that the continuous appraisal of natural landscapes, on the basis of innate relevances, is producing an underlying environmental affinity, which is framing and directing any cognitive appraisal process. However, it is also to be expected, that developmental and cultural influences in the form of cultural relevances as well as personality traits will introduce a fair amount of interrater variability into the final conscious and observable preference judgement.

The remarkable cross-cultural homogeneity of such preference judgements (Kaplan et al. 1972; Parsons, 1991), however, seems to indicate that the proposed

underlying environmental affinity or alienation, which is based on innate relevances, is actually a quite potent factor in this process. And if the influence of cultural relevances could be prevented, an even stronger cross-cultural uniformity in terms of peoples' preference judgements on various landscapes can be expected.

Preference judgements between natural environments

In terms of preference judgements between various natural settings, the proposed continuous affective appraisal process, on the basis of the innate relevance of familiarity, should not make any difference, as all natural settings are equal in that respect. Observable differences in preference judgements will therefore rely on other innate relevances. Nourishingness has been suggested as such a relevance accounting for people's preference for specific types of landscapes (Orians, 1980; 1986). The spatial configuration of environmental elements as described by Appleton (1988) and Kaplan & Kaplan (1989) are other innate relevances influencing preference judgements. There is a possibility that cultural relevances might also play a role under these conditions as certain landscapes and sceneries can be linked to schemata of prestigiousness, sociocultural status, power, and desirability.

In summary, the RD framework proposes that natural landscapes are widely preferred, because they allow for the emergence and strengthening of an underlying affective resonance (i.e. environmental affinity) which is priming and framing any further cognitive appraisal process. Existing theories of environmental preference built on specific factors such as mystery and legibility (Kaplan & Kaplan, 1989), prospect and refuge (Appleton, 1988), and nourishingness (Orians, 1980; 1986) are integrated into the proposed RD framework. These theories provide accounts of specific characteristics of environments, which have proved to be beneficial for human beings. These specific characteristics are conceived to be encapsulated by the proposed innate relevances. Existing theories of environmental preference emphasising physiological arousal (Russell & Mehrabian, 1974; Berlyne, 1970) are integrated

under the rubric of psycho-physiological sequelae. A state of optimal arousal is conceived to be a physiological consequence of the encounter between individuals and their physical surroundings. Its status within the proposed RD framework, therefore, is that of an epiphenomenon rather than that of a causal factor of preference judgements.

Nature as a healing force

The most extraordinary findings in the domain of environmental psychology have emerged from research into the effects of different environmental settings on mental and physical health. Roger Ulrich's groundbreaking work provided evidence that the mere view of nature can shorten a person's recuperation period after surgery (Ulrich, 1984) and is conducive to faster recovery from stress (Ulrich 1979; Ulrich & Simons, 1986 cited in Parsons, 1991). Qualitative research on the subjective experience of being in a wilderness setting indicates, that nature has a universal soothing, energising, and healing influence on humans (Fredrickson & Anderson, 1999; Greenway, 1995). The proposed RD framework is well suited to offer a theoretical explanation for restorative effects and the integration of existing theories in this field. As a conceptual cornerstone of the proposed RD framework, natural environments are seen to match any human perceiver's innate relevance of phylogenetic familiarity. Nature per se is thought to be inherently familiar and therefore generally non-threatening.

Optimal level of arousal as physiological sequel to environmental resonance

As has been argued before, the underlying affective resonance, emerging out of a perceiver's encounter with nature is linked to a strengthening of the parasympathetic part of the autonomic nervous system. In terms of its physiological sequelae, environmental affinity is conceived to be tantamount with a lowered heart rate, reduced galvanic skin reaction, lower blood pressure, and beneficial hormonal responses (Parsons, 1991). Thus, theories based on the notion of an optimal level of arousal (e.g. Berlyne, 1970) are effortlessly integrated into the

proposed RD framework as such an arousal level is conceived to be the automatic consequence of a match between innate relevances and natural environments.

Beyond the immediate effects on these stress related physiological indicators, as utilised in the general adaptation syndrome framework (Selye, 1956; 1973; 1982), or the "flight or fight" concept (Cannon, 1932), these changes have been implicated in long term physical health issues (Parsons, 1991). The psychological sub-field of psychoneuroimmunology emphasises detrimental long-term effects of stress on the individual's resilience to infectious processes (Evans & Edgerton, 1990; Stone, Reed & Neale, 1987). Environmental alienation, as a subconscious process, therefore, has to be looked at as a low level, yet pervasive, stressor, which is apt to contribute to such immunological long-term problems.

Relief from mental fatigue as cognitive sequel to environmental resonance

The cognitive school of thought on the restorative effect of natural settings is built on the notion of relief of mental fatigue as the crucial factor. The particular quality of wilderness settings to provide relief from cognitive strain has been described by Kaplan (1989) as 'soft fascination'. The core concept of this approach is the notion, that natural environments provide stimuli, which are so captivating, that they are involuntarily attended to by the perceiver. This kind of involuntary attention is thought to allow them to recuperate from the strain of voluntary attention required by other kinds of (urban) environments (Tennessen & Cimprich, 1995). At the same time natural environments are also experienced as tranquil (Herzog & Barnes, 1999) as opposed to other environments providing 'hard fascination' (i.e. captivating yet exciting stimuli such as car races etc.).

Within the proposed RD framework, affective dissonance – with environmental alienation as its most fundamental facet – is conceptualised as representing part of an early warning system, which reacts to actual or potential threats from the environment. Conversely, the absence of such warning signals in a state of affective resonance is assumed to allow the organism to relax. Relaxation is a process encompassing physiological, behavioural, affective and cognitive aspects.

The latter aspect is hereby defined as the freeing up of cognitive capacity, related to the detection and appraising of threats, thus leading to reports of cognitive clarity (Fredrickson & Anderson, 1999) and openness (Greenway, 1995).

From the point of view of the proposed RD framework, the cognitive state of test participants who had been exposed to nature, as described by Kaplan (1989) and others (Ulrich, 1983), seems to be one of non-attention rather than of a different kind of attention. Non-attention means, that no particular feature of the environment is capturing the perceiver's mental focus. It is therefore, the opposite of attention rather than a different degree of voluntary control (and therefore effort) over this process.

The new concept of environmental affinity, in the absence of concrete threats such as an attacking lion or rushing down a white water stream, means that relief from mental fatigue can be achieved through the absence of activating and directing affective influences on cognition. As the perceiver's system is not primed towards detecting and analysing potential or actual environmental threats, the possibility arises to engage in free-floating cognition such as daydreaming or to disengage from conscious cognition at all. Secondly, it is proposed that natural settings are simply not conducive to the activation and application of cultural relevances because these schemata are largely irrelevant in an environment that is free from artefacts. The consequence, again, is cognitive deactivation. Kaplan's original 'mental fatigue theory', therefore, has been modified by substituting the concept of non-attention for that of involuntary attention.

The reported state of clear wakefulness (Ulrich, 1983) and deep relaxation of people immersed in a natural environment seems to be closely related to mental states, commonly achieved only by meditation exercises. As illustrated by Descartes famous quote "cogito, ergo sum" (Kunzmann, Burkard & Wiedmann, 1991; Gaarder, 1991) engaging in cognition assumes a central role in western culture. It is no surprise then, that cognitive deactivation as the ultimate goal of meditation exercises (Kennedy, 1990; von Glasenapp, 1992) is very difficult to

achieve and takes years of rigorous practice. The state of non-attention linked to exposure to nature, on the other hand, seems immediately achievable within a very short period of time and is – in principle – enduring. In reality, however, non-attention as a cognitive sequel of environmental affinity has a temporary and often fleeting character. In most contemporary areas a multitude of artificial environmental elements such as the sounds of cars and planes intrude frequently into natural environments, thus bound to disturb the underlying affective resonance. Yet, even short intervals of exposure to nature seem sufficient to have a positive effect on an individual's mental and physiological health (Ulrich, 1983).

From the viewpoint of the RD framework it is therefore not surprising that psychotherapy utilises relaxation techniques, which often incorporate imagery of some natural content (e.g. Feindler & Ecton, 1986). It seems that, despite the absence of a conceptual rationale, the anxyolitic and relaxing influence of nature per se has been intuitively utilised by clinical psychology practice. The proposed RD framework is now able to provide a theoretical grounding of this longstanding practice.

Consequently, Kaplan's basic concept of nature as a "mental fatigue-relieving context" can easily be integrated into the RD framework. Cognitive deactivation is proposed as a consequence of environmental affinity based on the match between perceivers' innate familiarity relevance and their ESF. Relief from mental fatigue, indeed, is seen as one restorative factor of nature. However, as has been pointed out by critics (e.g. Ulrich, 1983; 1986) the provision of fascinating stimuli alone, which automatically and strongly draw the perceiver's attention to them, does not explain the superiority of natural settings over engrossing urban and other artefact dominated settings. Indeed the failure to specify how nature is providing soft fascination as opposed to urban environments, which may provide hard fascination, represents the biggest shortcoming of the cognitive approach. It also does not address the personal accounts of test participants, reporting a meditation-like state of non-attention. The new concept of environmental affinity, however, does specify the environmental content under which non-attention can

occur. And this content can only be provided by natural environments but not by artefact dominated settings. In fact, even small intrusions of artefacts of any kind into the perceiver's ESF suffice to weaken or turn the underlying affective resonance into dissonance (Mausner, 1996).

The psycho–evolutionary approach to restoration

Ulrich's psycho-evolutionary concept (1983; 1991), as the second dominant force in the restoration debate, is grounded in the traditional stress paradigm and emphasises the primacy of affect over cognition. Here, the restorative response of an individual to natural settings is seen as a process encompassing first and foremost affect and physiology. The fact that natural settings indeed elicit strong attention and interest, as emphasised by Kaplan, is not a contentious issue for Ulrich. Yet, according to his approach, the main restorative effect is thought to stem from a quick shift away from negative affect and towards positive affect. Furthermore, the perceiver's arousal level is thought to be lowered by an activation of the parasympathetic nervous system. In Ulrich's model, cognitive processes, therefore, are de-emphasised as a merely supporting mechanism. Nature is thought to elicit 'effortless and well-formed affective-cognitive structures' (Ulrich, 1983). The specific character of these structures, however, is not being further specified.

The individual's restorative response, according to the psycho-evolutionary concept (1991), can be attributed to socioculturally determined learning processes whereby the individual has been conditioned to like natural settings. Secondly, a biological preparedness (i.e. genetically determined predisposition) to acquire this restorative response, which has developed as an adaptive mechanism during human phylogenesis, has been put forward as an explanation. The earlier mentioned arousal theories, of course, were integrated by Ulrich's psycho-evolutionary theory of the restorative effect of nature. An optimal level of activity of the autonomous nervous system is acknowledged as having a restorative effect on the individual.

The psychoevolutionary approach (Ulrich et. al., 1983; 1986; 1991), as the second evolutionary theory on the restorative effect of nature can be integrated into the proposed RD framework. It is seen as describing a number of beneficial psycho-physiological sequelae linked to the emergence of an underlying affective resonance (i.e. affinity). Ulrich's somewhat mysterious "well-formed affective-cognitive structures", which are effortlessly activated in a nature setting, therefore, are interpreted as referring to the RD framework core concept of rather well defined and specific innate and cultural relevances. The innate type of relevance in particular is conceived to represent the mental structures, which allow environmental resonance and subsequent restorative psycho-physiological sequelae to unfold if the individual is surrounded by nature. The proposed framework, in respect to the restorative effect of nature, can therefore be regarded as an attempt to clarify and specify certain aspects of the psycho-evolutionary theory in the process of integrating it.

The proposed RD framework represents conceptual progress from the psycho-evolutionary approach, in that the characteristics of the sensory content of natural settings now can be specified. This is crucial, because only such a definition has the power to explain the superiority of natural over urban settings, despite the fact that both can provide similar degrees of involuntary attention and physiological arousal. As has been pointed out by critics of the "mental fatigue approach" (Parsons, 1991; Ulrich et al., 1991), involuntary attention in itself can be linked to restorative or stressful experiences and it is the information content which makes the difference. Both, Ulrich's psycho-evolutionary theory as well as Kaplan's work, merely refer to Zajonc's (1980) original vague notion of "preferenda". Now, however, "preferenda" can be defined as those environmental features and element, which have frequently been present during human phylogenesis. Their influence on preference judgements as well as psycho-physiological restoration processes can be seen as "long-term mere exposure effect" (Bornstein, 1989).

However, one particular conceptual leap distinguishes the proposed RD framework from psycho-evolutionary theory. The notion, that innate relevances

represent "hard wired", and therefore unlearned, templates goes beyond the position of evolutionary "preparedness" (i.e. genetically determined predisposition to acquire certain psycho-physiological functions more easily than others). The proposed framework does not assume that the restorative response to nature is something that needs to be acquired at all. Environmental affinity is an innate affective pattern, which automatically emerges when the individual comes into contact with nature.

Primacy of cognition or affect in preference judgements

The main contentious point between Kaplan's approach and the psycho-evolutionary theory is the question whether cognition or affect is the primary factor in psycho-physiological restoration. The proposed RD framework provides an opportunity to integrate both of these evolutionary approaches to environmental restoration as well as the purely arousal based position. This is possible, because affect and cognition are conceptualised as complimentary and concurrent aspects of the same principle appraisal mechanism, linking the perceiver to his environment. Environmental affinity, that is underlying affective resonance, is providing the continuous frame or background within which transient, specific, and temporary cognitive appraisal processes are taking place. The hotly debated question as to whether affect or cognition comes first becomes meaningless when one conceives of a relationship between the perceiver's cognitive-affective system, which is in continuous contact with the environment, and which therefore reacts instantaneously to any external changes.

The affect versus cognition primacy debate, as well as neurophysiological lines of investigation into perception, seem to be grounded in a common conceptual paradigm, which the proposed RD framework aims to avoid. This paradigm is grounded in the finding that it takes a measurable amount of time for any physical stimulus to be received, transformed and processed by the perceiver's perceptual-cognitive apparatus (Kalat, 1995). This fact has lead to a common view of

perception and associated cognition and affect as a sequential processing of incoming sensory information.

Already mentioned neurological models of perception (LeDoux, 1996) point to a difference in the speed, with which stimuli are being processed in various cortical and sub cortical structures. Research in this area relies heavily on the isolated presentation of single stimulus in order to track the test participant's processing of it (i.e. "peekaboo" technique). Findings in this area have been interpreted as providing evidence for the affect primacy hypothesis (Zajonc, 1980; Ulrich, 1983) as single stimulus information seems to be fed into two distinct channels, whereby the sub cortical (i.e. affective) loop is faster than cortical (i.e. cognition) processing (Parsons, 1991).

The alternative proposal presented here, is to ignore as inconsequential the initial minute time lag between the very first incoming sensory stimulus and the very first affective appraisal loop. This initial process might have occurred during the birth of an individual or even before this point. Instead, the emphasis should be on the fact, that after this initial contact between the individual and her environment a continuous contact exists for the rest of her life. Except for the initial encounter between the individual and her environment, a multitude of environmental data is processed, that is, received and evaluated, at any given moment in time. As has been explained earlier, this continuous process is based on continuously active innate relevances relating individuals to their entire environment. Of course, within this underlying affective frame, specific and transient sensory information processes of affective or cognitive nature do take place, as not all conceivable environmental elements are present all the time. This is seen as the rationale behind the stance that research findings, which are based on the presentation of a single stimulus, are misleading and probably irrelevant for the purpose of investigating the relationship of an individual with a real life environment. These lines of research suggest that an isolated particular object or sound or odour is suddenly appearing and subsequently sub cortically processed first, followed by cortical processing. While this might be true for a single environmental element,

which has just very rapidly entered someone's ESF, it is not for the entirety of the perceiver's environment. This entirety of sensory information is being present continuously.

As a result, the spurious debate about cognitive versus affective primacy in the restoration debate becomes obsolete as the proposed RD framework assumes that the underlying affective frame is always in place. Only specific cognitions and specific affect, linked to particular aspects of the environment, take place sequentially within this seamless frame. The notion, that individuals maintain a continuous and seamless underlying affective relationship with their environment throughout their life represents a conceptual leap from Ulrich's and Kaplan's work. The idea, that there is a quick onset affective reaction and a somewhat slower cognitive reaction to the same incoming sensory stimuli, on which much of the assertion of affective primacy is based, has been superseded by the notion of a continuous underlying affective frame. That is, environmental appraisal is seen, not so much as a dichotomy of quick onset affect versus slow onset cognition, but rather as transient cognition within a continuous affective frame.

In summary, the RD framework, represents conceptual progress in the field of the environmental preference and restoration debate, in that hitherto competing theoretical approaches are integrated into a coherent picture of an evolutionary developed appraisal mechanism, designed to guide individuals' relationship with their physical surroundings. The two postulated independent, yet interlinked, appraisal systems, based on two different sets of relevances, allow for the positioning of affective and cognitive, as well as physiological and behavioural, processes within the perceiver's general psycho-physiological functioning in respect to environmental perception.

Where to from here? — Applications and future research

In the preceding chapters, it has been outlined why the proposed RD framework of environmental perception has the conceptual power to integrate a number of diverse theories on environmental preference and restoration. In going beyond the boundaries of environmental psychology, conceptual links between the RD framework and theory in other psychological sub-fields will be described in this concluding chapter. Possible practical applications, which are arising out of these links, as well as suggestions for future research will be put forward in order to demonstrate the relevance of the proposed RD framework of environmental perception.

In the introduction and in subsequent chapters it has been made explicit, that the proposed theoretical framework pertains to the relationship between individuals and their current and immediate physical surroundings. Resonance and dissonance, which are emerging from non-perceptual sources, such as memory or mental imagery, are seen as outside the scope of the proposed RD framework. For this reason, the relevant current and immediate environment of the perceiver was conceptualised in terms of whole landscapes and sceneries, as well as particular elements such as objects, sounds, and odours.

One particular environmental element, namely other human beings, represents the focus of the sub-field of social psychology. Social psychology has been defined as a discipline that endeavours to "understand and explain how the thought, feeling, and behaviour of individuals are influenced by the actual, imagined, or implied presence of others" (Allport, 1985, cited in Franzoi, 1996). It becomes clear, that

social psychology, as far as it is concerned with the actual presence of other human beings in the ESF of a perceiver, overlaps with the proposed RD framework. Cultural relevances about power, physical attractiveness, ethnicity, and so forth certainly have an influence on the relationship between the perceiver and another person. This influence has already been described in many theories and models about interpersonal relationships, prejudice and so forth. It is envisaged, that the concepts of resonance and dissonance can be fruitful applied to this existing body of knowledge within social psychology. Conceptualising people as environmental elements who have the agency to fulfil or thwart the perceiver's needs and wants is expected to map onto a number of existing theories such as social perception, attitudes, persuasion, social influence, and interpersonal attraction. In this respect, the proposed RD framework represents a conceptual extension of these theories, pertaining to the physical encounter between individuals.

Similarly, if the current and immediate environment of a perceiver is that of a workplace, the link between the proposed RD framework and the sub-field of industrial and organizational psychology becomes obvious. Employees as well as employers and executive management personnel bring their idiosyncratic set of cultural relevances into the workplace situation. Depending on the agency of materials, machinery, and co-workers to fulfil the perceiver's work related needs and wants, such as recognition, monetary rewards, self-fulfilment, and so forth, resonance or dissonance with all their psycho-physiological sequelae will emerge. It is therefore expected that the proposed RD framework will map onto existing theories about job satisfaction, job motivation, job performance, and so forth.

Clinical psychology is yet another sub-field to which the proposed RD framework is thought to be applicable. The links between environmental resonance and dissonance on one hand and issues of mental health on the other hand do include aspects of the already mentioned psychological sub-fields. Therefore, it seems warranted that this area will be explored in greater detail than those of social or industrial/organisational psychology.

Comparatively little attention has hitherto been paid to artefact dominated settings as general etiological factors in mental health problems. However, the logical opposite of psycho-physiological restoration due to exposure to natural environments is psycho-physiological deterioration due to exposure to artificial environments.

A word of caution is necessary before the specifics of the link between the proposed RD framework and clinical issues are being discussed. It will not be claimed that the proposed framework provides an exclusive etiological explanation for mental health problems. Rather, it will be suggested that the affective appraisal of one's environment as potentially malignant can be a contributing factor, among many others, in the development of mental health problems. The prevalence of mental health problems, including depression and suicide, in New Zealand, unfortunately, shows that a relative abundance of natural elements in urban areas – when compared to those of other industrialised countries – is not sufficient to prevent these problems.

Traditionally, psycho-physiological problems have been linked to specific environmental factors such as crowding, noise, and so forth (Iwata, 1986). So far, inexplicable correlations have been found between air pollution and increased radiation, due to fluctuations in solar activity, and admission rates to mental health institutions. Seemingly, no theoretical explanation has yet been put forward to link anxiety or mood disorders to general environmental conditions other than seasonal variation in illumination (Rosenthal, Sack, Carpenter, Parry, Mendelson & Wehr, 1985).

From the viewpoint of the proposed RD framework, it seems that most contemporary environments of humans are phylogenetically unfamiliar. That is, visual, auditory, tactile, and olfactory artefacts dominate everyone's ESF to a large extent. As outlined earlier, the mismatch between innate familiarity relevance and ESF is conceptualised to lead to the emergence and strengthening of underlying affective dissonance (i.e. environmental alienation) tendencies. These tendencies,

in turn, are thought to have a directing and priming influence on the individual's entire psycho-physiological system.

Negative physiological sequelae of such an underlying dissonance are those described as autonomous nervous reactivity (Cannon, 1932; Selye, 1956; 1973; 1982). That is, environmental alienation is seen as a source of stress as physiologically defined by cardiovascular and endocrinological changes. However, it is not assumed, that this kind of underlying affective dissonance suffices to initiate strong or even measurable activation of the sympathetic nervous system. Rather, environmental alienation is thought to push the autonomic nervous system towards activation by providing a negative affective frame for the processing of environmental information. A priming effect is conceived to be conducive for the activation of cultural relevances, which are related to threat and danger. In other words, the perceiver's cognitive-affective system is thought to be geared towards the detection and appraisal of potential or actual environmental threats when immersed in an artificial environment.

Environmental alienation is not conceived to be under the voluntary control of the individual. This negative underlying affective frame is conceived to remain completely outside of one's awareness. A common example of environmental alienation is that of a manager working in an office environment, living in an ordinary suburban home, and commuting between these locations by car. While this person's day is probably marked by alternating periods of cognitive resonance and dissonance, based on the encounter between cultural relevances and her environment, it is also very likely, that the underlying environmental affective frame is one of almost continuous alienation. That is, most, if not all, of this individual's physical surroundings are phylogenetically unfamiliar.

As explained before, this state of environmental alienation is thought to activate and direct the perceiver's cognitive processing and the corresponding psycho-physiological sequelae (Salovey, Rothman, Detweiler & Steward, 2000). In other words, the cognitive system remains primed towards detecting and appraising of

potential or actual threats for prolonged periods of time. Meanwhile, the conscious experience is one of alternating states of resonance and dissonance based on more salient cultural relevances. For most people, living in an industrialised country, this means that their underlying affective relationship with their immediate physical surroundings is one of more or less constant alienation. Put simply, their subconscious "hard-wired early-warning-system" remains in a constant state of alert.

Another, and more insidious, possible long-term effect is the cognitive reattribution of the constant general affective dissonance tendency to salient environmental elements. It is proposed that the perceiver's cognitive system tries to make sense of the ongoing general activity of the affective warning system by trying to detect and appraise environmental elements in terms of their potential dangerousness. In most cases, this activity will be experienced – if at all – as a rather diffuse feeling of unease and dissatisfaction. However, it is conceivable, that in environmentally vulnerable individuals (Iwata, 1986) the constant pressure of the underlying environmental alienation leads to noticeable anxiety reactions.

Within the clinical literature on anxiety, the safety signal hypothesis (Seligman & Binik, 1977; Woody & Rachman, 1994) holds that people experiencing generalised anxiety disorder (GAD) are lacking safety signals in their environment. It is also known, that anxious individual's often have a general tendency to focus on and seek out potential threats (Beck, 1976; Mogg & Bradley, 1998; Mogg, Bradley, Williams & Matthews, 1993; Rapee, 1991). The RD framework clearly maps onto these clinical theories, as the underlying environmental alienation does represent a lack of environmental safety signals. It seems a distinct possibility that anxious people, in an attempt to account for their constant and diffuse feeling of threat, cognitively reattribute their diffuse, negative affect (Murphy & Zajonc, 1993) to more concrete and salient, yet unrelated, environmental elements. However, while the perceived threat, linked to particular elements, is regularly being debunked, the underlying affective dissonance persists. Thus, a new cycle of reattribution is required, and so forth. This perspective accounts for the, often diffuse, general

character of anxiety in GAD (Rapee, 1991) as well as for the fact that the target of the individual's worry and anxiety constantly changes and shifts (American Psychiatric Association, 1994). In this respect, it is interesting to note that exposure to natural environments – as well as mental imagery of similar content– has proved to have a palliative effect on anxiety (Parsons, 1991), thus providing support for the presented argument.

The RD framework does also map onto well-established evolutionary theories of specific phobias. As outlined earlier, some of these phobias (e.g. arachnophobia, snake phobia, fear of heights) have been attributed to a genetically determined preparedness of acquiring such fears (Öhmann, 1979; Seligman, 1971). However, theorists have already gone beyond the traditional learning paradigm by suggesting that these phobias might be based on completely unlearned (i.e. hard-wired) knowledge about the dangerousness of certain environmental elements (McNally, 1987). In terms of the RD framework, snakes, spiders, and heights (Bertenthal & Campos, 1984) are conceived to match with innate reference patterns of dangerousness, thus leading to affective dissonance and even consciously experienced negative emotions. Sub-cortical structures such as the amygdala and the hippocampus have been suggested (Parsons, 1991) as neurological correlates of this process.

Another possible conceptual link between the proposed RD framework and clinical problems arises out of the fact that environmental alienation is a fairly persistent phenomenon, which might be processed as uncontrollable by the perceiver. The only way to escape environmental alienation would be to immerse oneself in a natural setting. The popularity of items such as compact discs featuring natural soundscapes and therapeutic approaches such as aromatherapy can partly be explained by their natural ingredients, which are conducive to the emergence of environmental affinity. However, for most people living within the spatial and temporal confines of an industrialised society, no enduring escape from an environment that is dominated by artefacts is feasible or even conceivable. This means that most people have to live in an environmental context with a

locked-in-artefact-dominance characteristic. Therefore the perceiver's subconscious locus of control, in terms of environmental affinity or alienation, is firmly one of external character. It is now conceivable that the futile attempts to alleviate affective dissonance are leading to a profound sense of helplessness (Seligmann, 1974) or hopelessness (Abramson, Metalsky & Alloy, 1989), which, combined with a particular attributional style (Abramson, Seligman & Tesdale, 1978), might represent an etiological factor in mood disorders such as dysthymic disorder or depression. Of course, the suggested appraisal processes within the RD framework are of subconscious nature, while the mentioned theories on helplessness and hopelessness are based on conscious cognition and affect. Yet, it seems permissible to speculate about a subconscious cognitive and affective analogue to those etiological explanations of depressive disorders.

As a final, and most speculative, remark, it is also conceivable that the RD framework can be applied to explain certain features of other mental disorders such as autism or schizophrenia, which are marked by a breakdown or disturbance of an individual's relationship with his environment. There is a conceptual possibility that the typical negative reactions to the environment of autistic or schizophrenic persons are partly attributable to their inability to cope with underlying environmental alienation. This might be caused by a disproportionately strong affective appraisal system, which overwhelms cognitive processes. Alternatively, an insufficient cognitive system, which fails to provide a counterbalance for the persistent affective dissonance could be a causal factor. Therefore, strongly negative reactions to certain artificial environmental elements such as fluorescent lights, long straight corridors, sudden noises, and so forth, shown by individuals with autism and schizophrenia (D. Clarke, personal communication, 7 May 1998), might be attributable to overwhelming environmental alienation.

Practical applications

If the physical surroundings of most people actually have the claimed deleterious effects, then landscaping, architecture, interior and industrial design are areas to which the RD framework can be applied in order to produce whole environments, as well as single elements which do not contribute towards environmental alienation as strongly as traditional designs do. Organic design features, exemplified by the rounded shapes of cars from the 1980s onwards are a prime example of industrial design, which does incorporate basic natural features. This is not to say, of course, that the inclusion of round shapes in car design suffices to eliminate the environmental alienation of any urban dweller. In fact, triggering other traffic participants' early warning system through strong non-natural features such as bright colours can be a life saving factor. However, any shift towards more natural features and patterns in someone's ESF is expected to be conducive to a corresponding psychological shift towards environmental affinity, thus somewhat alleviating the pressure of the described early warning system. Extreme living situations such as those encountered by personnel of Arctic and Antarctic facilities, underwater facilities, and manned space exploration could become a target for creating a quasi-natural environment.

It is proposed that the application of the RD framework can even assume clinical relevance for anxious or depressed individuals with a high degree of environmental vulnerability (Iwata, 1986). The alteration of their ESF in the form of deliberately introducing as many natural elements as possible, in order to alleviate the constant pressure from environmental alienation, should have an added therapeutic effect over and above conventional psychotherapeutic interventions. One way to achieve this effect would be to create a quasi-natural refuge zone at home or at the workplace. Such a zone could be created by introducing natural elements, such as plants, water features, and a wilderness soundscape (i.e. CD) into the ESF. In connection with additional items, such as wallpaper depicting a natural landscape, or herbal oils, visual, tactile, olfactory, and auditory sensory input conducive to environmental affinity could be provided. It is proposed that a

multi-modal approach addressing as many sensory modalities as possible will be more effective than altering only one aspect of the ESF. Even short exposure to nature seems to have a beneficial effect (Ulrich, 1983). Therefore, the creation and use of such a domestic or public refuge zone is proposed to have therapeutic value supporting traditional psychotherapy by directly improving clients' underlying affective state, as far as it is attributable to their environmental appraisal.

Empirical evidence for exposure to nature as an anxyolitic agent has already been gathered (Parsons, 1991) and the RD framework could be utilised to harness this general therapeutic effect in a more specific and efficient way for individuals. As it becomes increasingly difficult for anyone to escape the physical environment of an industrialised country, which is dominated by artefacts, the possibility arises to apply the RD framework to the development of virtual reality computer programmes. Somewhat ironically, in the future, computer generated virtual environments might provide the main avenue for urban dwellers to experience true environmental affinity by providing the opportunity to immerse oneself in a natural setting. This is not a far-fetched vision, as such virtual reality environments are already used as therapeutic tools in psychotherapy for phobias (Rothbaum, Hodges, Kooper, Opdyke, Williford & North, 1995; Hodges, Rothbaum, Kooper, Opdyke, Meyer, North, deGriff, & Williford, 1995; Rothbaum, Hodges & Kooper, 1997). Furthermore, the use of a virtual reality programme, in this case, would represent nothing more than a sophisticated technological extension of the described domestic or workplace "refuge zones" or of existing relaxation, which are based on guided imagery (Leuner, 1984) of some kind of preferred natural environment (e.g. Feindler & Ecton, 1986; Hudetz, Hudetz & Klayman, 2000). Virtual reality or real life refuge zones represent an improvement over these traditional mental imagery techniques in that the direct exposure to a natural environment does not require any mental effort, which in itself is seen as a stressor. Finally the application of the RD framework in the design of the physical layout of mental health institutions might have the agency to alleviate positive

schizophrenic symptomatology as well as behavioural outbursts in autistic clients due to the reduction of environmental alienation.

Future research

The RD framework of environmental perception, of course, raises questions which need to be addressed by future research. Most of the concepts which have been outlined in the preceding chapters rest on an existing body of psychological theorising and research. However, it has been emphasised that the process of developing this theoretical framework, integrating existing theories into it, as well as its application to various psychological sub-fields, have made it necessary to go beyond these conceptual sources in order to create the envisaged model of the profound relationship between human perceivers and their physical environment.

The proposed theoretical framework encompasses a complex network of interdependent components. Resonance and dissonance emerge out of this network and represent a part of it at the same time. The proposed relationship between these components, which also include feedback and feed-forward loops, is by no means of a simple linear character. It is not envisaged that a specific amount of artificial elements in someone's ESF will create a measurable dissonance of a predictable strength. The perceiver's affective frame is conceived to be in constant flux, thereby shifting from resonance to dissonance and back. Similarly, the position of elements in someone's EAC in respect to a particular cultural relevance, as well as the relative weight of these relevances, is the result of a rather dynamic process. Indeed, the notion of perception as a continuous process, unfolding as the ever-changing encounter between individuals and their entire environment, is probably the biggest conceptual step away from the existing theories, on which the proposed RD framework is drawing.

Of course, the more holistic view of perceiver and environment inevitably must have methodological corollaries for research in the field of environmental psychology. One of the most salient implications is the fact that research, which does not include every sensory modality, will not be able to tap into

environmental affinity or alienation to any satisfactory degree (Hetherington, Daniel & Brown, 1993; Ulrich, 1983). This is because environmental affective resonance or dissonance rests on the immediate and continuous contact between individuals and their entire ESF.

The results of research which rely on photographic, or auditory, or videographic representation of environments, will inevitably be contaminated, as the ESF of a test participant will encompass, not only relevant elements, but also objects, sounds, and odours of the laboratory itself. In other words, environmental affinity or alienation at the time of the conscious preference judgement or restoration measure will be influenced by any number of visual, auditory, olfactory, and tactile elements besides the presented target stimulus. By definition, the photographic representation of an environment becomes just another environmental element in the ESF, at the time of the experiment, instead of assuming the status of the ESF itself.

If valid results regarding environmental affinity or alienation are to be obtained, all sensory modalities have to be involved and any extraneous sensory information has to be excluded. It is clear that photographs or videos do not provide the necessary immersion experience (Hull & Stewart, 1992). However, modern computer technology, in the form of virtual reality programmes, might provide a solution for this dilemma, as entire environments could be simulated. While the experimenter would have complete control over the ESF content, a total immersion experience could be created. Virtual reality technology is already used to train pilots, marine personnel, and astronauts. Psychotherapy has also started to make use of this relatively new technology as a tool in desensitisation treatment for phobias (Rothbaum et al., 1995; 1997; Hodges et. al., 1995) and psychologists involved in rehabilitation use it to rebuild skills and confidence in patients with brain trauma. These applications point to future possibilities for research in environmental psychology. However, for the time being, the inclusion of adequate tactile and olfactory elements in such simulations has yet to be accomplished.

Natural versus artificial environments

On the basis of these general considerations regarding the field of environmental perception, from the perspective of the proposed RD framework, a research programme can tentatively be outlined. Qualitative and quantitative research is thought to complement each other (Schroeder, 1991) in the endeavour to shed light onto issues, which have been raised by the proposed RD framework. The logical starting point of research into components of the RD framework and its implications for various sub-fields in psychology would be the core concept of natural versus artificial environments. The most promising strategy seems to be to gather categorical statements from people exposed to various environments. Qualitative and quantitative methodology could fruitfully be combined in order to delineate characteristics of natural and artificial environments. The respective environments would have to be pre-selected according to the principles outlined in the chapter on the ESF and relevances. That means that participants would be exposed to settings which have been defined as phylogenetically familiar or unfamiliar. The only instruction given to participants would be to focus on their immediate experience of the settings while attempting to categorise them. Their responses need to be recorded immediately during the exposure in order to keep interference from memory and other cognitive processes to a minimum. Again, virtual reality technology would give the researcher the greatest control over the content of the ESF of the participants. A computer generated ESF would allow subtle – maybe even subliminal – manipulation in order to derive the characteristics of elements and their features, which lead the participant to categorise his ESF as natural or artificial. It would be possible to gradually introduce phylogenetically unfamiliar elements into the controlled ESF, thus changing the proportion of natural to artificial content. This methodology could gauge the participant's threshold for the perception of an environment as artificial.

Furthermore, if the participant was asked to provide a post hoc rationale for his categorisation (Hagerhall, 2000), the specific characteristics on which the decision was based should emerge. The hypothesis would be that those characteristics,

which had been manipulated, are cited by the participant. If the core concept of phylogenetic familiarity has validity, corresponding categories (i.e. natural versus artificial) can be expected to emerge from the participants' responses. This research design could also be extended to include preference judgements between different ESFs. It would be hypothesised that participants preferred an ESF, which is of purely natural content, over that, which encompasses artificial elements. If the variation between the presented ESFs is very subtle, or even subliminal, so that no rationale for the decision can be provided by the participant, it could be assumed, that the postulated innate relevances have influenced the preference judgement.

It is expected, that support for some core concepts of the proposed RD framework will be the result of such a line of research. However, until the problem of adequate tactile and olfactory representation has been solved, real life settings are the most feasible option to undertake this kind of research.

Environmental affinity versus alienation

In a similar vein, the concept of environmental affinity and alienation (i.e. affective resonance and dissonance) could be investigated by instructing participants not just to categorise the target environment but also to give an unstructured account of their experience. These accounts could be analysed and coded in order to uncover common themes used by the participants to describe their experience. The hypothesis would be that descriptions of affective resonance would emerge from exposure to natural environments while affective dissonance would emerge from exposure to environments saturated with artefacts. These descriptions could be used to refine the definition of environmental alienation and affinity as they refer to global affective states, which are difficult to verbalise. Therefore, emerging common descriptions of these states would allow for a more precise definition of these concepts.

Apart from these new research programmes it seems promising to revisit existing material in order to re-evaluate previous research results in the light of the proposed theoretical framework. Stimulus material (i.e. photographs etc.), which

has been used in research on preference judgements and restoration could be re-classified along the described natural versus artificial categories. The results of these studies could then be interpreted from the viewpoint of the proposed RD framework. The hypothesis underlying this procedure would be that test participants' preference judgements or measures of psycho-physiological restoration reflect their environmental affinity or alienation rather than the originally proposed factors.

Environmental vulnerability

The next step in the envisaged research programme would be to use the validated and refined definitions of natural versus artificial environments as well as the definitions of environmental affinity and alienation to develop a psychometric instrument of environmental vulnerability. This instrument would be designed to tap into an individuals' sensitivity to the presence of artefacts in their ESF. Existing measures, such as the desire for control of the physical environment (Jorgenson, 1978), subscales of the Environmental Response Inventory (Mc Kechnie, 1974; 1977), or Sonnenfeld's (1969, cited in McAndrew, 1993) early attempt at developing an environmental personality measure, could be used as a starting point in the development of such an instrument.

The successful expansion of such an instrument could have positive ramifications for psychotherapy in regard to clients with anxiety and depression. As explained earlier, the alteration of the ESF of an anxious or depressed client is thought to have a therapeutic effect, thus increasing the efficacy of conventional treatment. In fact, this claim could provide the rational for future research in the domain of clinical applications of the proposed RD framework, either in the form of a clinical randomly controlled trial, or single case studies.

Conclusion

In conclusion, it has been demonstrated that the proposed theoretical resonance-dissonance framework of environmental perception can be seen as a means to

integrate a number of hitherto competing theories in the sub-field of environmental psychology. Preference judgements about certain types of landscapes and the psycho-physiological restorative effect of nature on human beings are thought to be linked to a universal cognitive-affective appraisal process. Existing theories are seen as addressing various facets of this process, which can be unified by the proposed RD framework.

Secondly, it has been demonstrated that the proposed RD framework can be seen as providing a conceptual point of intersection of various psychological sub-fields such as environmental psychology, social psychology, industrial/organisational psychology, and clinical psychology. The outlined cognitive-affective appraisal process and its psycho-physiological sequelae are applicable to a wide range of issues and have practical implications for professionals working in these areas.

Thirdly, it has been demonstrated that the proposed RD framework can be seen as stimulating further theorising and research in a number of psychological sub-fields such as environmental psychology and clinical psychology. It is envisaged that more research questions will arise when the proposed framework is applied to other psychological sub-fields such as industrial/organisational psychology and social psychology.

Therefore, the proposed RD framework has achieved the aims which were outlined in the introductory chapter.

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Appendix A: Glossary

Affective Dissonance	Underlying, negative, and diffuse affective frame due to a mismatch between positive innate relevances and the perceiver's current physical surroundings or a match between negative innate relevances and the perceiver's current physical surroundings.
Affective Resonance	Underlying, positive, and diffuse affective frame due to a match between positive innate relevances and the perceiver's current physical surroundings.
Artefact	Environmental elements with particular features, which have not been present in humans' environments during phylogenetically relevant periods of time.
Cognitive Dissonance	Cognitive realisation that specific environmental elements do not have the agency to meet the perceiver's culturally given needs and wants or cognitive realisation that specific environmental elements do have the agency to thwart the perceiver's culturally given needs and wants.
Cognitive Resonance	Cognitive realisation that specific environmental elements do have the agency to meet the perceiver's culturally given needs and wants.
Cultural Relevance	Mental schema encompassing explicit knowledge, images, and beliefs about personal needs and wants, which have been shaped by social learning processes.
Environmental Affinity	Environmental affective resonance due to a match between perceivers' innate phylogenetic familiarity relevance and their current physical surroundings.

Environmental Alienation	Environmental affective dissonance due to a mismatch between perceivers' innate phylogenetic familiarity relevance and their current physical surroundings.
Environmental Awareness Continuum (EAC)	Mental arena encompassing conscious and unconscious processing of all incoming sensory information
Environmental Sensory Field (ESF)	Totality of available sensory information about physical surroundings, encompassing objects, sounds, odours, and surfaces.
Five–Part Model	Cognitive psychotherapy concept that cognition, affect, behaviour, and physiology of an individual, together with the specific situation, all represent interacting components of a system of psycho–physiological functioning.
Innate Relevance	Hard–wired, reference patterns shaped by environmental conditions, which have been present during phylogenetically relevant periods of time. Templates providing a mental yardstick to appraise one's physical surroundings in terms of phylogenetic familiarity, nourishingness, affordances, dangerousness, pleasantness, prospect and refuge, and mystery and legibility.
Macro–Level	Refers to the totality of an individual's environmental sensory field in terms of available sensory information.
Meso–Level	Refers to single elements such as particular objects, sounds, and odours contained in an individual's ESF.
Micro–Level	Refers to basic features of which a single environmental element consists.
Nano–Level	Refers to the molecular structure underlying the basic features of a single environmental element.
Nature	Naturally occurring environmental elements with particular features, which have frequently been present in humans' culturally unaltered environments during phylogenetically relevant

	periods of time.
Piko–Level	Refers to the subatomic structure underlying the molecular structure of single environmental elements.
Psycho–physiological sequelae	Umbrella term for cognition, emotion, physiology, and behaviour, which are seen as interlinked components of the Five–part model.
Quasi–Artefact	Naturally occurring environmental elements with particular features, which have not frequently been present in humans' culturally unaltered environments during phylogenetically relevant periods of time.
Quasi–Nature	Human made environmental elements with particular features, which have frequently been present in humans' culturally unaltered environments during phylogenetically relevant periods of time.
Relational Intensity	Significance of a single environmental element in terms of its location, locomotion and trajectory relative to the perceiver. The closer to the perceiver an element is and the faster it moves the greater is its relational intensity. Similarly, when it moves toward the perceiver its intensity is greater than when it moves away.
Relevance	Umbrella term for internal structures of the perceiver, providing a mental yardstick for the appraisal of the physical surroundings in terms of their agency to meet adaptational or culturally given needs and wants.
Schema	Set of knowledge, beliefs, and images about self, others, the world, and the future, held by the perceiver.
Sensory Field	Refers to that part of space–time, which is immediately accessible to perceivers via their sensory organs. Usually individuals have a visual, auditory, olfactory, tactile, and gustatory sensory field which combine to constitute their idiosyncratic ESF.

Template Innate reference pattern, to which the physical surroundings of perceivers are automatically and continuously compared. The content of these templates is seen as the result of evolutionary processes.