Beyond savanna: An evolutionary and environmental psychology approach to behavioral effects of nature scenery in green advertising

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ABSTRACT

Evolutionary psychology has been proposed as an analytic framework for the behavioral effects of landscapes displayed in advertising. In this study, an evolutionary and environmental psychology approach is used to analyze affective reactions to advertising depicting specific natural environments or urban scenes, both prominent ingredients of contemporary advertising imagery. The experimental field study exposed 750 participants at random to one advert of a set of 13 experimental green energy advertisements, each displaying a different biome. Six basic emotional responses (pleasure, arousal, happiness, freedom, safety, and interest) as well as attitude toward the ad and brand attitude were assessed subsequently. Anova and structural equation analysis were used for data analysis. Results of the study confirm the leading opinion on generalized more positive behavioral effects toward visual stimuli representing nature scenes with biospheric contents as opposed to pictures of urban environments or desert settings. In line with earlier empirical research, further findings do not support the hypothesis on an innate preference for savanna landscapes in adults but confirm preferences for images of lush green landscapes with water and familiar biomes. Overall results give significant support to the application of environmental and evolutionary psychology to advertising.

1. Introduction

The visual representation of nature is widely used in advertising to evoke positive emotional associations. Most often, marketing and advertising efforts rely on associating products and brands with visual images of nature (Goodrum & Dalrymple, 1990; Gould & Minowa, 1994; Gunster, 2004; Messaris, 1997; Wilson, 1992). However, despite numerous studies on advertising messages in the broadest sense, there has been surprisingly little research on the representation of nature. The very few studies that make reference to this topic are mostly focused on environmental advertising claims (e.g., Banerjee, Gulas, & Iyer, 1995; Iyer & Banerjee, 1993; Kilbourne, 1995; Manrai, Manrai, Lascu, & Ryans, 1997; Merten, 1993) as, in particular, the introduction of environmental marketing has led to an additional surge of advertising campaigns figuring pictorial presentations of pristine and unspoiled natural environments. With few exceptions (Gordon, 1997; Hem, Iversen, &

Grønhaug, 2003), empirical research on picture preferences or other behavioral effects of specific nature representations in advertising has been extremely scarce. However, it seems plausible to suppose that consumer's exposure to different kind of nature scenery represented in advertising should lead to differentiated patterns of perceptual and behavioral consequences.

Colarelli and Dettmann (2003) proposed evolutionary psychology as an analytic framework for landscapes' perceptual effects in advertising. Recent research suggests that evolutionary psychology is a valid and scientifically cogent framework for studying human behavior in general (Barkow, Cosmides, & Tooby, 1992; Buss, 2008; Cosmides & Tooby, 1994; Fuentes, 2009; Wright, 1995), as well as consumer behavior and advertising effects in particular (Bagozzi & Nataraajan, 2000; Lynn, Pereira, & Kampshroeder, 1998; Saad, 2004, 2007; Saad & Gill, 2000). Evolutionary psychology proposes that the human mind is a product of evolution by natural and sexual selection. Moreover, it is composed of functional and domain-specific psychological mechanisms or modules that are geared toward guiding human behavior in these distinct domains. Habitat selection may be considered an evolutionary evolved module still relevant today in determining landscape preferences. Environmental preferences have been investigated through evolutionary aesthetics as a part of evolutionary

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psychology. Evolutionary aesthetics is the attempt to understand the aesthetic judgment of human beings and their spontaneous distinction between "beauty" and "ugliness" as a biologically adapted ability to make important decisions in life. Aesthetic response is defined as preference or like-dislike affect in association with pleasurable feeling and neurophysiologic activity elicited by visual encounter with an environment (Dutton, 2003; Thornhill, 1998; Ulrich, 1986). Several authors, such as, Lynn, Kampschroeder, and Pereira (1999) and Saad and Gill (2000) linked the evolved preferences for specific landscapes to consumer preferences and positive affective responses to marketing stimuli. In particular, advertising using nature images may appeal to these evolved preferences for specific landscapes (Colarelli & Dettmann, 2003).

In addition, environmental psychology may also be a useful paradigm for analyzing nature advertising. Indeed, at the view of the literature, it is not always clear where to draw the line between environmental and evolutionary psychology as both domains seem to be deeply interwoven in the analysis of phenomena such as, for instance, habitat selection or landscape preference. Environmental psychology has been widely applied to the behavioral effects of retail environments (Donovan & Rossiter, 1982; Eroglu, Machleit, & Davis, 2003), and it seems also a promising approach to the analysis of the perceptual effects of specific landscapes in advertising.

In this study, research on evolutionary and environmental psychology is reviewed to address perceptual mechanisms involved in behavioral effects of nature imagery in an advertising context. In the empirical study, a sample of consumers was exposed to a set of experimental green energy advertisements depicting visual stimuli representing different types of natural landscapes, as well as to one ad representing urban scenery. Subsequently, the attitude toward the ad, the degree of basic emotional responses evoked by the ad, and the attitude toward the promoted brand was assessed for each ad and compared across the different experimental conditions. The implications for the use of landscapes in advertising are discussed.

2. Conceptual framework

2.1. Behavioral effects of nature scenery

Research stretching over several decades has shown consistently the overall preference for natural scenery as opposed to artificial environments (Calvin & Curtin, 1972). The attraction toward nature is widely considered a significant aspect of human behavior (Wilson, 1984). Numerous studies have demonstrated humans' preference for environments with natural elements over those that are predominantly built (Cackowski & Nasar, 2003; Kaplan & Kaplan, 1989; Purcell, Lamb, Peron, & Falchero, 1994). Natural settings are generally overrepresented among favorite places and underrepresented among the unpleasant places (Hartig, Kaiser, & Bowler, 2001; Korpela, Hartig, & Kaiser, 2001; Newell, 1997). Also, shifting from urbanized, complex environments to more natural environments has been considered of intrinsic value for human beings. Numerous research findings in health, medicine, and psychology appear to be supportive of the proposition that nature has some inherently positive effects on physical and psychological well-being for humans (Frumkin, 2003). For instance, in a series of experiments, the exposure to images of nature led to more positive influences on psychophysiological states than urban scenes. There was also a consistent pattern for nature, in particular water, to have more positive influences on emotional states (Ulrich, 1981, 1984; Ulrich, Altman, & Wohlwill, 1983). Furthermore, there is prominent evidence of greater restorative effects arising from experiences in nature, compared to urban environments (Hartig,

Mang, & Evans, 1991; Kaplan, 1995; Kaplan & Kaplan, 1989; Maller, Townsend, Pryor, Brown, & Leger, 2006).

2.2. Evolutionary and environmental psychology approaches to landscape preferences

Most people instinctively find clear, flowing water more beautiful than stagnant water, grassy landscapes with scattered trees and lakes more attractive than arid, treeless landscapes, and mountains or hills in the distance more attractive than flat terrain. Also, research has shown that people have strong preferences for water sources, oasis, flowers, ripe fruits and savanna-type landscapes, closed forest canopy, as well as mountains (Colarelli & Dettmann, 2003; Dutton, 2003; Thornhill, 1998).

Several theories have been suggested on the development of human preferences for specific landscapes and biospheric environments: information processing or knowledge acquisition theory (Kaplan & Kaplan, 1989; Kaplan, Kaplan, & Brown, 1989), attention restoration theory (Kaplan, 1995; Kaplan & Kaplan, 1989), psycho-evolutionary or affective theory (Ulrich, 1983, 1986), prospect-refuge theory (Appleton, 1975), habitat selection theory (Orians, 1980; Orians & Heerwagen, 1992), and the anthropological perspective (Williams & Cary, 2002). There is considerable evidence that humans prefer landscapes that are relatively open and smooth with wide horizons, distant views, grasslands with low and homogeneous vegetation, dispersed round-shaped trees with a low, spreading form or a canopy broader than the overall tree height, and the presence of clear water. These seemingly universal preferences are most commonly attributed to inherited and evolutionary evolved predispositions (Appleton, 1975; Balling & Falk, 1982; Kaplan et al., 1989; Orians, 1980, 1986; Orians & Heerwagen, 1992; Ulrich, 1983, 1986). Orians (1980) postulated the savanna hypothesis on an evolved human affinity toward savanna-type landscapes. Psychological mechanisms for landscape preferences may have evolved because landscapes with certain features were more adequate for survival and reproduction than others. This has been suggested as the main reason most people still regard certain types of natural environments as more beautiful and, hence, attractive than others (Kaplan, 1992; Orians & Heerwagen, 1992), as suggested by evolutionary aesthetics (Colarelli & Dettmann, 2003; Dutton, 2003; Thornhill, 1998). The innate preference for savanna-type landscapes may have provided an evolutionary advantage for hunters and gatherers living in East Africa (Orians, 1980). These more open landscapes provided the highest concentration of resources to primitive humans including best shelter, hunting, and disease-free environments (Appleton, 1975), and allowed humans to navigate and move through the landscape with ease (Kaplan, 2001). In addition, several studies indicate that scenes depicting water or moist vegetation are preferred over those that are more arid (Balling & Falk, 1982; Lyons, 1983; Ulrich, 1981). Thus, natural selection would have favored an innate preference among humans for savanna-like environments, especially those also containing clear, flowing water—containing usually fewer potentially harmful bacteria than stagnant water—and cliffs and caves for shelter (Kaplan, 1987; Orians & Heerwagen, 1992). Consistent with the existence of such an adaptation, research has found that savanna preferences are fairly consistent across cultures and geographic regions (Balling & Falk, 1982; Ulrich, 1977).

Still, the only direct empirical test of preferences for different biomes (Balling & Falk, 1982)—examining visual preferences for slides of tropical rain forest, temperate deciduous forest, coniferous forest, savanna, and desert—provided only limited support for the hypothesis that humans have an innate preference for savanna-like settings. In Balling and Falk's (1982) study, only elementary schoolchildren showed a significant preference for savanna over all

other biomes. From midadolescence and through adulthood, more familiar natural environments were equally preferred to savanna, whereas the desert was the least liked biome for all age groups. Because none of the respondents in the study had ever been in tropical savannas, these authors postulate a developmental pattern, with innately programmed responses that are later modified by experience in particular settings, leading to preferences for familiar biomes.

Other research did not provide evidence to support the hypothesis of innate landscape preferences (Lyons, 1983). Instead, it is suggested that preferences for specific vegetational biomes change through the subjects' life cycle, with the highest preferences for the most familiar biome, and that the development of landscape preference is a cumulative process sensitive to socially differentiating factors. Further research indicates that biodiversity has a positive relationship with landscape beauty ratings, but that perceived biodiversity differs with educational and occupational background of respondents (Van den Berg, Vlek, & Coeterier, 1998).

The review of the literature shows that, while some authors support the hypothesis on innate preferences for savanna landscapes, several studies did not sustain this proposition. After all, although the evolutionary approach to landscape preferences seems important and valuable, the restriction to the period of Pleistocene hunter-gathers in the African savanna probably falls short of capturing the dynamics of the evolution of human behavior. Some behavioral adaptations are likely to be of a much older heritage, others newer (Buss, 2008; Fuentes, 2009).

2.3. Behavioral effects of landscapes in advertising: hypothesis and conceptual model

Evolutionary evolved landscape preferences are commonly targeted in advertising. Visual representations of attractive landscapes appealing to evolved preferences for verdant savanna-like landscapes, mountains, water, and flowers are used to evoke positive emotional associations (Colarelli & Dettmann, 2003). Thus, another indicator for the evolutionary origin of landscape preferences is the cross-cultural use of specific nature images in advertising. Indeed, the uses of nature imagery as advertising claims seem to follow intuitively the principles of environmental aesthetics suggested by Dutton (2003) and Thornhill (1998).

Several studies support the notion that advertising imagery may emulate the effects of the exposure to "real landscapes." In fact, photographic pictures of landscapes, plants, animals, and water have shown to have a similar effect to the genuine objects (Coeterier, 1983; Hull & Stewart, 1992; Penning-Rowsell, 1981). Therefore, it can be assumed that the effects identified with regard to "genuine" nature scenery can be set off using photographs or video recordings as used commonly in advertising.

Thus, in the light of the reviewed research on preferences for natural landscapes with vegetation as opposed to artificially build or urban environments (e.g., Cackowski & Nasar, 2003; Kaplan & Kaplan, 1989; Purcell et al., 1994) and the more positive influence of exposure to nature on psychophysiological and emotional states (Frumkin, 2003; Ulrich, 1981, 1984; Ulrich et al., 1983), nature imagery in advertising may wield similar behavioral effects with regard to emotional responses evoked by the ad, attitude toward the ad, and attitude toward the promoted brand. Emotional responses as a result of the exposure to nature imagery may then be associated with the brand and transform the consumption experience of the advertised brand (Aaker & Stayman, 1992).

H1: Ads representing nature scenery with biospheric elements (vegetation, animals) evoke more positive emotional responses and lead to a more favorable attitude toward the ad and attitude

toward the brand as opposed to ads representing urban scenery or desert landscapes.

With regard to the evolutionary theory on inherited predisposition to certain landscape types and biospheric elements (Balling & Falk, 1982; Kaplan, 1992; Orians, 1980; Orians & Heerwagen, 1992), as well as the predictions of evolutionary aesthetics (Dutton, 2003; Thornhill, 1998), it seems plausible that adverts displaying savanna-type landscapes with wide horizons, grasslands with dispersed round-shaped trees, as well as nature scenery with clear flowing water would have the most favorable influence on the consumer (Colarelli & Dettmann, 2003).

H2: Ads displaying savanna-type landscapes elicit more positive emotional responses and lead to a more favorable attitude toward the ad and attitude toward the brand as opposed to ads representing other types of nature scenery, urban environments or desert landscapes.
H3: Ads depicting nature scenery with the presence of clear water evoke more positive emotional responses and lead to a more favorable attitude toward the ad and attitude toward the brand than ads displaying nature imagery in which clear water is absent.

However, there is also evidence for innately programmed responses that are later modified by experience in particular settings, leading to stronger preferences for more familiar biomes in adults (Balling & Falk, 1982). On the other hand, Lyons' (1983) research did not support the theory on innate preferences for specific landscapes, but also showed that humans prefer the most familiar biome. To address these findings, the following hypothesis postulating a complementary or alternative mechanism for the subject's psychological responses to nature scenery in advertising is proposed:

H4: Ads displaying nature scenery that is familiar to the subject evoke more positive emotional responses and lead to a more favorable attitude toward the ad and attitude toward the brand than ads representing more unfamiliar natural environments.

The theoretical framework of this research is depicted in Fig. 1. In addition to the abovementioned hypothesis, the model comprises effects between the proposed variables emotional response, attitude toward the ad, and attitude toward the brand. Also, as this study focuses on environmental advertising, the influence of the consumer's environmental concern on these variables is considered as well. Environmental concern has been suggested as a significant driver of environmental behaviors. There has been extensive research on the knowledge regarding environmental issues, but also on more emotional dispositions or states such as the individual indignation about the destruction of nature, as well as on intentions regarding environmental behaviors
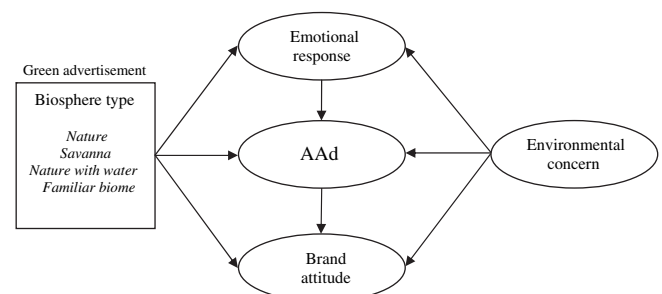

Fig. 1. Conceptual model: perceptual effects of the biosphere type in green advertising (AAD: Attitude toward the advert).

(e.g., Cope & Winward, 1991; Dunlap & Van Liere, 1978; Hines, Hungerford, & Tomera, 1987; Kinnear, Taylor, & Ahmed, 1974; Mainieri, Barnett, Valero, Unipan, & Oskamp, 1997; Maloney & Ward, 1973; Van Liere & Dunlap, 1981). Several authors suggested that the growing environmental consciousness among consumers may lead to generalized positive attitudes toward products and brands that are perceived as environmentally sound (Bech-Larsen, 1996; Eagly & Kulesa, 1997; Swenson & Wells, 1997; Tanner & Wölfing Kast, 2003), and in particular toward renewable energy (Bang, Ellinger, Hadjimarcou, & Traichal, 2000). Thus, it seems more than plausible that the emotional response of a consumer toward ads displaying environmental content as well as his or her attitude toward the ad and the brand will be affected by environmental concern. The understanding of these effects—even if not central to the subject of this research—may contribute to a more holistic analysis of the main research hypothesis.

3. Method

3.1. Experimental design

With the aim to address empirically the issues raised in the conceptual part of this paper and to test the proposed hypotheses, an experimental field study of the behavioral effects of natural landscapes and urban environments displayed in green advertising was carried out. For this purpose, 13 experimental ads for a fictitious renewable energy brand were developed showing an identical brand name, advertising copy, and formal structure. The ads, however, varied in the content of the depicted image. Each ad figured one distinct landscape, one ad depicting a desert setting and one ad showing urban scenery (see Appendix). Eleven of the ads represented biospheric content consistent of visual representations of pleasant nature scenery. Pictures chosen showed a savanna setting with trees, an Alpen-style mountain lake with cattle, a savanna setting with elephants, a mountain creek, a European beech tree on a meadow, an Australian eucalyptus tree in a bush setting, palm trees on a tropical beach, a stretch of Mediterranean coastline, a Canadian landscape with lakes and forests, a European oak forest, and an European pine forest. The urban picture showed a sunny view of a visually pleasant street with classical and modern buildings, whereas the picture of the desert depicted a rocky desert in the sunlight. The selection of pictures was based on previous qualitative research with last-year undergraduate university students, consistent of several sessions of focus groups and in-depth interviews, in which participants were asked to point out pictures from a wide selection of images of nature and urban scenery that would best evoke positive feelings of pleasure and attraction.

Each participant of the study was exposed randomly to one of the experimental ads and subsequently surveyed on a number of questions, including his or her emotional responses to the ad, attitude toward the ad, attitude toward the brand, and environmental concern. After completing these tasks, all 13 ads were shown to the subject, who was instructed to point out the most and least liked ad of the selection. A total of 750 participants were interviewed in six towns and villages of northern Spain. The geographical location of the sample on the Atlantic side of northern Spain is specially relevant in this case, as landscapes and vegetational biosphere are lush green, similar to central European scenery, including mountainous landscapes, and very different from the remaining Iberian landscapes that are predominantly dry. This fact may have its implications for the test of Hypothesis 4 on the effects of the familiarity of the biome depicted in advertising. Subjects were selected by random sampling (random street interviews) following a quota criterion regarding sex (50% female – 50%

male) and age (20%: 20–25, 25%: 26–35, 30%: 36–50, 20%: 51–65, 5%: >65). The quota criteria were established to guarantee sex equality in the sample and to focus on middle aged consumers. Subjects not born and grown up in the area were excluded from the sample through a filter question. The final composition of the sample was 54.3% female and 45.7% male, aged between 18 and 90 years. Of the interviewees 39.2% had a higher education (university degree).

3.2. Measurement

After the exposure to the randomly selected experimental advert, participants were asked to rate their emotional responses to the ad, attitude toward the ad, attitude toward the brand, and environmental concern. The emotional response to the ad was assessed as six basic emotions on five point semantic differential scales (pleasure, arousal, happiness, freedom, safety, and interest). The emotional dimensions were derived from the literature on basic and environmental emotions to assess in particular the emotions evoked by the different environments depicted in the ads (Havlena, Holbrook, & Lehmann, 1989; Holbrook & O'Shaughnessy, 1984; Izard, 1977; Mehrabian & Russell, 1974; Plutchik, 1980; Russell, 1980; Russell & Mehrabian, 1977; Watson & Clark, 1992).

Overall attitude toward the ad (AAd) was assessed through a single-item indicator (ad liking) on a ten point scale anchored by "very much" and "no at all". Consistent with accepted measures in attitude research (Allen, Machleit, & Kleine, 1992; Herr & Russell, 1993; Kim, Lim, & Bhargava, 1998; Mitchel, 1986; Petty, Unnava, & Strathman, 1991), attitude toward the brand was measured as a multidimensional construct through the indicators "overall evaluation", "product attribute evaluation", "positive feeling," and "purchase intention." Participants were asked to rate their agreement with single-phrase statements on five point Likert-type agreement scales anchored by "strongly agree" and "strongly disagree".

The development of the measurement scale for the environmental concern construct was based on several measurement scales used in the literature such as, for instance, the New Environmental Paradigm (NEP) Scale (Dunlap & Van Liere, 1978; Grunert & Juhl, 1995; Kilbourne, Beckmann, & Thelen, 2002; Kinnear et al., 1974; Lee & Holden, 1999; Maloney & Ward, 1973; Stone, Barnes, & Montgomery, 1995). The construct was assessed by three indicators measuring the attitude toward environmental degradation, the perception of the need for environmental protection, and personal environmental concern on five point Likert-type agreement scales anchored by "strongly agree" and "strongly disagree".

The measurement scales were tested by confirmatory factor analysis (Table 1). The resulting measurement model can be considered satisfactory, as criteria for model fit (Bentler, 1990; Byrne, 2001; Hu & Bentler, 1995; Jöreskog & Sörbom, 1984; Kaplan, 2000; Steiger & Lind, 1980) indicate an adequate fit of the factor structure to the underlying data.

Additionally, Anderson and Gerbing (1988) recommend the analysis of the dimensionality of the constructs of psychometric measurement scales, such as the one developed for the purpose of this survey, to assure that, in first place, a set of indicators meant to assess one specific latent variable indeed describes only one underlying construct and not several constructs and, in second place, that distinct variables in the study address distinct underlying constructs that cannot be combined into one dimension. With respect to the outcome of the analysis of dimensionality, variance extracted and construct reliability (Hair, Anderson, Tatham, & Black, 1998) exceed their respective recommended thresholds (Bagozzi & Yi, 1994; Fornell & Larcker, 1981; Hair et al., 1998). Also, factor

Table 1
Confirmatory factor analysis: regression coefficients (standardized, unstandardized), correlations, variance extracted, construct reliability, model fit ($p < 0.001$ in all Regression coefficients).

Indicator	Factor		
	Emotional response	Brand attitude	Environmental concern
Pleasure	0.87; 1.86		
Relaxation-excitement	0.88; 2.08		
Happiness	0.72; 1.62		
Freedom	0.80; 1.87		
Safety	0.68; 1.47		
Interest	0.60; 1.90		
Overall evaluation		0.86; 0.75	
Product attributes		0.82; 0.75	
Positive feeling		0.80; 1.66	
Purchase intention		0.72; 0.73	
Environmental concern 1			0.83; 0.66
Environmental concern 2			0.86; 0.67
Environmental concern 3			0.77; 0.67
Correlations			
Brand attitude	0.45		
Environmental concern	0.24	0.44	
AAd	0.70	0.56	0.22
Variance extracted	0.50	0.61	0.67
Construct reliability	0.74	0.83	0.86
Model Fit	GFI = 0.95; AGFI = 0.93; NFI = 0.96; CFI = 0.97; RMSA = 0.05		

Note: GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; NFI = Normed Fit Index; CFI = Comparative Fit Index; RMSEA = root mean square error of approximation.

loadings of all indicators are significant ($p < 0.001$) and exceed minimum recommended values of 0,5. Furthermore, the variance extracted measures exceed the square of the correlation estimate in all cases. Constructs who fulfil this condition can be considered distinct and sufficiently explained by their respective measurement scales. Thus, the proposed measurement scales can be considered adequate.

4. Results

4.1. Comparison of mean values

The further steps of the analysis addressed the effect of the experimental factor "kind of landscape" on the participants' behavioral responses. For this purpose, in the first step of the analysis, mean values of the indicators were compared across the experimental conditions. The comparison of the mean values of the observed variables between the different conditions of the experimental factor revealed significant differences as a result of the type of landscape represented in the advertisement. Subjects showed a clear preference for ads representing biospheric nature imagery, as compared to the visual representations of urban scenery or desert landscape, with respect to attitude toward the ad (AAd) and positive emotional responses evoked by the stimuli. Results of the descriptive analysis of the attitude toward the ad scale and the semantic differential scales on emotional responses are shown in Table 2. One way ANOVA analyses were performed for AAd and each of the emotional response measures. Differences in the preference scores are appreciable and overall significant ($p < 0.001$). Highest rated on AAd were, in the following order, the ads depicting the mountain creek, the Canadian lake and forest setting, and the Mediterranean coastline, while the ads with the urban setting and the desert scenery received nearly equally low ratings. The AAd ratings were for most part consistent with the task to select the most liked and disliked ads of the whole set of print ads. The ads depicting the mountain lake (28.44%), the mountain creek (24.08%), and the Canadian lakes and forests (11.29%) were most liked, while the rocky desert (42.99%), the urban setting (37.41%), and the Australian eucalyptus bush setting (10.61%) were most disliked.

With regard to the elicited emotional reactions, the ad depicting the desert setting rated lowest on pleasure, happiness, safety, and interest and second lowest in inspiring a feeling of relaxation and freedom. Conversely, the urban scenery elicited least feelings of freedom and relaxation, while rating second lowest on pleasure, happiness, safety, and interest. The Australian eucalyptus bush scenery rated moderately low on all dimensions. Strongest positive responses were evoked by the ads depicting the mountain creek, the Mediterranean coastline, and the Canadian lakes and forests. Both ads representing typical savanna scenery were close to the mean ratings of all ads. A further step of the analysis addressed the mean differences (t-test) of the AAd ratings of the ad depicting a genuine savanna trees setting with the remaining adverts. As the results show (Table 3), ratings of the savanna ad were not significantly higher than ratings of ads with several other landscapes such as Oak forests, European beech trees, pine forests, etc.

Also, several of the other nature ads show significantly higher ratings (t-test), that is, the ads depicting the mountain creek, the mountain lake with cattle, the Canadian lake and forest setting, the Mediterranean coastline, and the oak forest. With the Bonferroni correction of p-values, still two ads, the Canadian lakes and forest scenery and the mountain creek, prove to be significantly higher rated than the savanna ad.

4.2. Structural equation analysis

Subsequent to the comparison of mean values of the indicators, a structural equation analysis was conducted to further assess the effects of the experimental factor and the relations between latent variables using AMOS 6 (Table 4 and Fig. 2). The experimental factors are addressed as four individual binary variables with a "zero" value for the absence of the experimental condition and a value of "one" for the experimental condition. For instance, for factor "savanna", observations from participants exposed to one of the two pictures showing savanna landscapes were computed "one" in this experimental factor, and "zero" if exposed to any of the other experimental ads. The simultaneous effects of all factors were then computed in the scope of the model following Bagozzi and Yi (1994) and Jöreskog and Sörbom (1984).

Also in the case of this model, measures indicate an adequate representation of the underlying data by the proposed factor structure. Furthermore, the structural equation analysis indicates very significant and pronounced positive influences of the emotional response of the subject to the ads on AAd (standardized regression coefficient [Beta] = 0.68; $p < 0.001$), while AAd significantly contributes to the attitude toward the brand (Beta = 0.46; $p < 0.001$). With regard to the experimental conditions, the analysis reveals the following pattern of interactions: The fact that an experimental ad represented biospheric content, as opposed to an urban setting or a desert landscape, contributed significantly and directly to the subject's emotional response (Beta = 0.44; $p < 0.001$) and, indirectly, to attitude toward the ad (mediated by the relationship emotional response – AAd) and attitude toward the brand (mediated by AAd). A very similar pattern of effects can be observed for the experimental condition nature scenery containing clear water versus nature and urban scenery without the presence of clear water: This factor wields an additional direct effect on the subject's emotional response (Beta = 0.19; $p < 0.001$), as well as a small direct effect on AAd (Beta = 0.06; $p = 0.04$), while it also contributes indirectly to AAd and brand attitude.

Table 2
Mean value differences (ANOVA) of attitude toward the Ad and emotional response indicators (N, F, p, mean values).

Landscape Type		Dependent Variables						
		AAd	Pleasure	Relaxation–excitement	Happiness	Freedom	Safety	Interest
	F	17.01*	32.20*	22.35*	36.77*	17.20*	13.76*	18.77*
	N							
Mountain creek	60	8.18	8.75	8.70	8.25	8.68	7.37	8.03
Lakes & forests Canada	58	8.11	8.40	8.34	7.86	9.69	7.66	7.84
Coast Mediterranean	57	7.91	8.65	8.05	8.11	8.61	7.05	8.04
Mountain lake cattle	59	7.67	8.14	8.10	7.64	8.46	7.24	7.46
Oak forest	57	7.48	8.04	8.07	7.37	8.04	6.72	7.16
Beech tree Europe	59	7.34	8.24	8.24	7.63	8.44	7.12	7.07
Palm beach tropical	58	7.14	8.22	8.34	7.93	8.05	6.67	7.17
Pine forest	54	6.98	7.50	7.57	7.31	7.43	6.22	7.11
Savanna elephants	57	6.96	7.42	7.12	6.89	7.68	5.79	7.04
Savanna trees	57	6.80	7.39	7.53	6.60	8.02	6.40	6.37
Eucalyptus Australia	61	6.13	6.31	6.44	5.30	6.36	5.62	5.57
Rocky desert	58	5.19	4.31	6.21	3.26	5.07	4.02	3.91
Urban city	55	5.07	5.62	4.42	4.75	4.09	5.45	5.65
Total	750	7.01	7.47	7.48	6.84	7.60	6.42	6.80

*$p < 0.001$.

Remarkably, the experimental condition "savanna landscapes" did not yield any significant effects on any of the analyzed variables. Conversely, landscapes being more familiar (European landscapes) versus more unfamiliar landscapes (e.g., Australian bush, tropical palm beach) had a positive direct effect on emotional response (Beta = 0.12; $p < 0.001$). Finally, regarding the role of the subjects' environmental concern, this construct did, as expected, contribute significantly to brand attitude (Beta = 0.33; $p < 0.001$). Additionally, also the emotional response to the ads was affected by environmental concern (Beta = 0.20; $p < 0.001$), while the direct influence on AAd was non-significant.

5. Discussion

The empirical study addressed the influence of specific landscape types displayed in advertising on the emotional response of the surveyed population, as well as on attitude toward the ad (AAd) and brand attitude. The results of the comparison of mean values and the structural equation analysis were both found to confirm clearly generalized more positive influences of ads containing visual stimuli representing biospheric nature scenes as opposed to ads depicting urban environments and vegetation-free desert settings (Hypothesis 1). This result is consistent with the leading opinion in the literature on landscape preferences

(Cackowski & Nasar, 2003; Calvin & Curtin, 1972; Kaplan & Kaplan, 1989; Korpela, Hartig, & Kaiser, 2001; Newell, 1997; Purcell et al., 1994; Wilson, 1984).

Also the effect of the familiarity of the subject with a specific landscape type was confirmed (Hypothesis 4). The fact that an ad displayed a biome more familiar to the sample (central European mountain scenery, Atlantic or Mediterranean coastlines, European oak or beech tree vegetation) led to more favorable emotional responses and enhanced AAd, as well as attitude toward the brand. Conversely, the ad depicting the Australian eucalyptus bush setting represented the lowest rated biosphere. This conclusion is not contradicted by the high ratings of the Canadian lake and forest scenery, as the visual style of this specific biosphere is quite similar to central European nature-reserve scenery present in the sample's environment. These findings are consistent with Lyons (1983), who also found highest preferences for the most familiar biome.

However, contrary to the theory on human's preference for savanna-type landscapes (Orians, 1980), the ads representing genuine savanna scenery did not yield the most favorable behavioral impact of all the nature ads (Hypothesis 2). Ratings of these ads were rather near mean values of all ad ratings. Considering that the sample consisted exclusively of adults, both of the latter findings (preference for familiar natural environments but not for authentic savanna landscapes) are consistent with Balling and

Table 3
Mean value differences (t-test) between AAd ratings of the savanna Ad and other ads with nature scenery (means, standard deviation, t, p), bonferroni correction posthoc analysis (p).

Landscape type	N	Mean AAd	Standard deviation	t	p	p-Bonferroni
Savanna trees	57	6.80	1.96	–	–	–
Mountain creek	60	8.18	1.60	−4.17	$p < 0.001$	0.004
Lakes & forests Canada	58	8.11	1.21	−4.26	$p < 0.001$	0.014
Coast Mediterranean	57	7.91	1.37	−3.50	0.001	0.107
Mountain lake cattle	59	7.67	1.83	−2.45	0.016	0.912
Oak forest	57	7.48	1.68	−1.97	0.052	1.000
Beech tree Europe	59	7.34	1.69	−1.57	0.118	1.000
Palm beach tropical	58	7.14	1.71	−0.98	0.331	1.000
Pine forest	54	6.98	1.55	−0.52	0.602	1.000
Savanna elephants	57	6.96	1.82	−0.45	0.651	1.000
Eucalyptus Australia	61	6.13	2.12	1.78	0.078	1.000
Rocky desert	58	5.19	2.71	3.63	$p < 0.001$	$p < 0.001$
Urban city	55	5.07	2.11	4.46	$p < 0.001$	$p < 0.001$

Table 4
Structural Equation analysis: regression coefficients (standardized, unstandardized, p), squared multiple correlations (R^2), model fit.

Variable	Emotional response	AAd	Brand attitude
Experimental factor nature	0.44; 0.32; *	−0.02; −0.02; NS	0.03; 0.02; NS
Experimental factor Savanna	0.00; 0.00; NS	0.01; 0.02; NS	−0.06; −0.04; NS
Experimental factor nature with clear water	0.19; 0.10; *	0.06; 0.06; 0.04	−0.07; −0.04; NS
Experimental factor familiar biome	0.12; 0.06; *	0.00; 0.00; NS	0.02; 0.01; NS
Environmental concern	0.20; 0.26; *	0.05; 0.11; NS	0.33; 0.44; *
Emotional response		0.68; 1.07; *	0.05; 0.05; NS
AAd			0.46; 0.30; *
R^2	0.41	0.51	0.43
Model fit	GFI = 0.95; AGFI = 0.93; NFI = 0.95; CFI = 0.97; RMSA = 0.05		

Note: GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; NFI = Normed Fit Index; CFI = Comparative Fit Index; RMSEA = root mean square error of approximation.
*$p < 0.001$; NS: non-significant.

Falk's (1982) study, in which only elementary schoolchildren showed a significant preference for savanna over all other biomes. Because none of the respondents in their study—as in this study—had ever been in tropical savannas, these authors postulate a developmental pattern—partly consistent with Lyons' (1983) hypothesis—with innately programmed responses that are later modified by experience in particular settings, leading to preferences for familiar biomes.

Still, nature imagery of ads most liked by the surveyed subjects had one visual element in common lacking in the remaining nature images: the presence of clear water (although water was also present in the savanna elephants image, this water was actually muddy and brownish). Ads containing images of clear water and lush green vegetation evoked also the most favorable emotional responses and lead to the highest AAd and brand attitude ratings (Hypothesis 3). These findings are consistent with earlier empirical research on innate human dispositions toward water and landscapes containing water (Ulrich, 1981, 1984; Ulrich et al., 1983), and thus support an evolutionary origin of human preferences for particular nature scenery (Appleton, 1975; Kaplan, 1987; Orians & Heerwagen, 1992).

In addition, it should be considered that innate dispositions to specific landscapes may as well have evolved at a later stage after the emigration of prehistoric humans from central Africa, or even earlier during the development of human's ancestors. After all, also many external and internal body features have evolved and specialized to distinct geographical regions since *Homo sapiens* migrated to Asia, Europe, and the Americas (Buss, 2008; Fuentes, 2009). The interviewed sample may have ancient, innate preferences for the type of central European biome that characterizes its typical natural environment. Overall, the more favorable responses

toward ads displaying lush green landscapes with the presence of water strongly supports an evolutionary origin of these preferences, as habitats with these characteristics offer advantages crucial for survival and procreation. Thus, even if the exposure to ads displaying savanna landscapes did not lead to the most favorable responses, the results give overall support to the application of evolutionary psychology to advertising (Bagozzi & Nataraajan, 2000; Colarelli & Dettmann, 2003; Saad & Gill, 2000).

A complementary perspective – consistent with Kaplan and Kaplan's (1989) Attention Restoration Theory – is introduced, if local national holiday customs are taken into account: The pictures of ads rating highest on AAd and positive emotional responses all reflect nature scenery typical for Spanish holiday destinations. On the other hand, people probably choose green mountains with clear creeks or the coast for their vacations because they are programmed by evolution to prefer these landscape settings. There could even be a further reinforcement of landscape preferences through a feedback process if particular landscapes are more often chosen because of innate behavioral dispositions and then become more familiar to the subject. After all, not many Spaniards spend their vacations on the typical Spanish plains which are dry, flat, and treeless. Thus it would probably not be recommendable to use that kind of landscape in an advertising setting.

6. Implications

Overall, the results of this study support an environmental and evolutionary psychology approach to the analysis of consumer behavior (Bagozzi & Nataraajan, 2000; Lynn, Kampschroeder and Pereira, 1999; Saad & Gill, 2000). Environmental and evolutionary psychology have been shown in this research to offer a useful

Fig. 2. Structural equation analysis: Effects of the experimental factor "biosphere type" and relations between constructs (standardized coefficients, NS: non-significant).

framework for the understanding of landscape's effects in advertising (Colarelli & Dettmann, 2003). Habitat selection as a Darwinian module seems to be still relevant today in determining landscape preferences and apparently also the behavioral effects of specific landscapes displayed in advertising.

As far as advertising effectiveness is concerned, the conclusions from this research imply that advertising and particularly green advertising may use to its advantage the potential of favorable behavioral effects of using images of natural landscapes with vegetation, as opposed to pictures of urban environments or desert scenery. Transformational advertising – i.e., advertising that transforms the consumption experience of a product or brand through the exposure of the consumer to the ad (Aaker & Stayman, 1992) – and emotional conditioning may provide a useful framework for the association of brands with positive emotional responses evoked by nature imagery. Consumers may experience experiential or hedonic brand benefits that may lead to an improvement in attitude toward the ad and brand (Hirschman & Holbrook, 1982; Holbrook & Hirschman, 1982; Park, Jaworski, & MacInnis, 1986). A brand can be conditioned, that is, emotional experiences can be associated with that brand as a consequence of the consumer's exposure to emotional brand advertising (Allen & Madden, 1985; Bierly, McSweeney, & Vannieuwkerk, 1985; Burke & Edell, 1987; Stuart, Shimp, & Engle, 1987).

This research has shown that these behavioral effects can be enhanced, if ads display pictures of specific biomes. Findings lead to the recommendation of the use of images of pleasant natural landscapes with lush green nature scenery with vegetation, mountains and the salient presence of clear water, ideally depicting familiar biomes and possibly appealing on nature vacation schemata. Pictures of non-familiar landscapes that do not appeal to evolutionary evolved habitat preferences should best be avoided.

7. Limitations and future research

Regarding the limitations of this study, the most problematic issue is probably raised by the comparability of different visual content, since the ratings of compared images may vary due to other than biospheric content-related variables. Further aesthetic dimensions of the pictures may have their share in determining the emotional responses and AAd ratings of the participants. Our method to control these influences consisted in the selection, in the scope of focus group sessions, of the most visually appealing images for each analyzed landscape type or urban setting out of a very large quantity of pictures available in several commercial databases.

Still, future research should address the interaction of the observed effects with other visual variables such as the pictures' information rate. Environmental psychologists Mehrabian and Russell (1974) demonstrated that the emotional response and, in particular, evoked pleasure are related to the experienced environment's information rate. On the other hand, also participants' preferences for colors may have also played an important role and should be considered. Environmental colors have been shown to affect behavioral responses such as consumer feelings and purchase likelihood. Especially the color "blue" has been found to be preferred and to affect behavioral dispositions positively (Bellizzi & Hite, 1992; Schindler, 1986). The seemingly innate and universal preference for blue is possibly linked to the color of sky and water and as such probably of evolutionary origins (Saad & Gill, 2000).

Overall, future studies should further extend the knowledge of the extend to which the behavioral effects of landscapes in advertising are rooted in general evolutionary instincts, common to all human beings, or determined by culture specific variables, in particular, given the increasingly global character of advertising and media communication.

Acknowledgments

Appendix. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jenvp.2009.10.001.

References

Aaker, D. A., & Stayman, D. M. (1992). Implementing the concept of transformational advertising. *Psychology & Marketing, 9*, 237–253.
Allen, C. T., Machleit, K. A., & Kleine, S. S. (1992). A comparison of attitudes and emotions as predictors of behavior at diverse levels of behavioral experience. *Journal of Consumer Research, 18*, 493–504.
Allen, C. T., & Madden, T. J. (1985). A closer look at classical conditioning. *Journal of Consumer Research, 12*, 301–315.
Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modelling in practice: a review and recommended two-step approach. *Psychological Bulletin, 103*, 411–423.
Appleton, J. (1975). *The experience of landscape.* London: Wiley.
Bagozzi, R. P., & Nataraajan, R. (2000). The year 2000: looking forward. *Psychology & Marketing, 17*, 1–11.
Bagozzi, R. P., & Yi, Y. (1994). Advanced topics in structural equation models. In R. P. Bagozzi (Ed.), *Advanced methods of marketing research* (pp. 1–51). Oxford: Blackwell.
Balling, J. D., & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior, 14*, 5–28.
Banerjee, S., Gulas, C. S., & Iyer, E. (1995). Shades of green: a multidimensional analysis of environmental advertising. *Journal of Advertising, 24*, 21–32.
Bang, H., Ellinger, A. E., Hadjimarcou, J., & Traichal, P. A. (2000). Consumer concern, knowledge, belief, and attitude toward renewable energy: an application of the reasoned action theory. *Psychology & Marketing, 17*, 449–468.
Barkow, J. H., Cosmides, L., & Tooby, J. (1992). *The adapted mind: Evolutionary psychology and the generation of culture.* NY: Oxford University Press.
Bech-Larsen, T. (1996). Danish consumers' attitudes to the functional and environmental characteristics of food packaging. *Journal of Consumer Policy, 19*, 339–363.
Bellizzi, J. A., & Hite, R. E. (1992). Environmental color, consumer feelings, and purchase likelihood. *Psychology & Marketing, 9*, 347–363.
Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.
Bierly, C., McSweeney, F. K., & Vannieuwkerk, R. (1985). Classical conditioning of preferences for stimuli. *Journal of Consumer Research, 12*, 316–323.
Burke, M. C., & Edell, J. (1987). The power of feelings in understanding advertising effects. *Journal of Consumer Research, 14*, 421–433.
Buss, D. M. (2008). *Evolutionary psychology: The new science of the mind* (3rd ed). Boston: Pearson.
Byrne, B. M. (2001). *Structural equation modelling with AMOS.* Mahwah, New Jersey: Lawrence Erlbaum.
Cackowski, J. M., & Nasar, J. L. (2003). The restorative effects of roadside vegetation. *Environment and Behavior, 35*, 736–751.
Calvin, J. D., & Curtin, M. (1972). An attempt at assessing preferences for natural landscapes. *Environment and Behavior, 4*, 447–470.
Coeterier, J. F. (1983). A photo validity test. *Journal of Environmental Psychology, 3*, 315–323.
Colarelli, S. M., & Dettmann, J. R. (2003). Intuitive evolutionary perspectives in marketing practices. *Psychology & Marketing, 20*, 837–865.
Cope, D., & Winward, J. (1991). Information failures in green consumerism. *Consumer Policy Review, 1*, 83–86.
Cosmides, L., & Tooby, J. (1994). Better than rational: evolutionary psychology and the invisible hand. *American Economic Review, 84*, 327–332.
Donovan, R., & Rossiter, J. (1982). Store atmosphere: an environmental psychology approach. *Journal of Retailing, 58*, 35–57.
Dunlap, R. E., & Van Liere, K. D. (1978). The new environmental paradigm: a proposed instrument and preliminary results. *Journal of Environmental Education, 9*, 10–19.
Dutton, D. (2003). Aesthetics and evolutionary psychology. In J. Levinson (Ed.), *The oxford handbook for aesthetics* (pp. 693–705). New York: Oxford University Press.
Eagly, A. H., & Kulesa, P. (1997). Attitudes, attitude structure, and resistance to change. In M. H. Bazermann, D. M. Messick, A. E. Tenbrunsel, & K. A. Wade-Benzoni (Eds.),

Environment, ethics, and behavior (pp. 122–153). San Francisco: The New Lexington Press.

Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2003). Empirical testing of a model of online store atmospherics and shopper responses. *Psychology & Marketing, Special Issue on Behavioral Dimensions of e-Commerce, 20*, 139–150.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*, 39–50.

Frumkin, H. (2003). Healthy places: exploring the evidence. *American Journal of Public Health, 93*, 1451–1456.

Fuentes, A. (2009). *Evolution of human behavior*. New York/Oxford: Oxford University Press.

Goodrum, C., & Dalrymple, H. (1990). *Advertising in America*. New York: Harry N. Abrams, Inc.

Gordon, W. (1997). Selling paradise and adventure: representations of landscape in the tourist advertising. *Australian Geographical Studies, 35*, 47–60.

Gould, S. J., & Minowa, Y. (1994). Are they saying the same thing? An exploratory study of Japanese and American automobile advertising. In B. G. Englis (Ed.), *Global and multinational advertising* (pp. 193–204). Hillsdale, NJ: Erlbaum.

Grunert, S. C., & Juhl, H. J. (1995). Values, environmental attitudes, and buying of organic foods. *Journal of Economic Psychology, 16*, 39–62.

Gunster, S. (2004). You belong outside: advertising, nature, and the SUV. *Ethics & the Environment, 9*, 4–32.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. NJ, USA: Prentice Hall.

Hartig, T., Kaiser, F. G., & Bowler, P. A. (2001). Psychological restoration in nature as a positive motivation for ecological behavior. *Environment and Behavior, 33*, 590–607.

Hartig, T., Mang, M., & Evans, G. W. (1991). Restorative effects of natural environment experiences. *Environment and Behavior, 23*, 3–26.

Havlena, W. J., Holbrook, M. B., & Lehmann, D. R. (1989). Assessing the validity of emotional typologies. *Psychology & Marketing, 8*, 19–42.

Hem, L. E., Iversen, N. M., & Grønhaug, K. (2003). Advertising effects of photos used to portray nature-based tourism attractions. *Scandinavian Journal of Hospitality and Tourism, 3*, 48–70.

Herr, P. M., & Russell, H. F. (1993). The attitude-to-behavior process: implications for consumer behavior. In A. A. Mitchel (Ed.), *Advertising exposure, memory, and choice* (pp. 119–140). Hillsdale, New Jersey: Lawrence Erlbaum.

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *Journal of Environmnetal Education, 18*, 1–18.

Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: emerging concepts, methods and propositions. *Journal of Marketing, 46*, 92–101.

Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption. *Journal of Consumer Research, 9*, 132–140.

Holbrook, M. B., & O'Shaughnessy, J. (1984). The role of emotion in advertising. *Psychology & Marketing, 1*, 45–64.

Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling. Concepts, issues and applications* (pp. 76–99). London: Sage Publications.

Hull, R. B., & Stewart, W. P. (1992). Validity of photo-based scenic beauty judgments. *Journal of Environmental Psychology, 12*, 101–114.

Iyer, E., & Banerjee, B. (1993). Anatomy of green advertising. *Advances in Consumer Research, 20*, 494–501.

Izard, C. E. (1977). *Human emotions*. New York: Plenum Press.

Jöreskog, K. G., & Sörbom, D. (1984). *LISREL VI user's guide*. Mooresville, IN: Scientific Software.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York: Cambridge University Press.

Kaplan, R., Kaplan, S., & Brown, T. (1989). Environmental preference: a comparison of four domains of predictors. *Environment and Behavior, 21*, 509–530.

Kaplan, S. (1987). Aesthetics, affect and cognition: environmental preference from an evolutionary perspective. *Environment and Behavior, 19*, 3–32.

Kaplan, S. (1992). The restorative environment: nature and human experience. In D. Relf (Ed.), *The role of horticulture in human well being and social development* (pp. 134–142). Portland, OR: Timber Press.

Kaplan, S. (1995). The restorative benefits of nature: toward an integrative framework. *Journal of Environmental Psychology, 15*, 169–182.

Kaplan, S. (2000). New ways to promote pro-environmental behavior: human nature and environmentally responsible behavior. *Journal of Social Issues, 56*, 491–508.

Kaplan, S. (2001). The restorative environment: nature and human experience. In M. R. DeHart, & J. R. Brown (Eds.), *Horticultural therapy: A guide for all seasons* (pp. 8–11). St Louis, MO: National Garden Clubs.

Kilbourne, W. E. (1995). Green advertising: salvation or oxymoron. *Journal of Advertising, 24*, 7–19.

Kilbourne, W. E., Beckmann, S. C., & Thelen, E. (2002). The role of the dominant social paradigm in environmental attitudes: a multinational examination. *Journal of Business Research, 55*, 193–204.

Kim, J., Lim, J. S., & Bhargava, M. (1998). The role of affect in attitude formation: a classical conditioning approach. *Journal of the Academy of Marketing Science, 26*, 143–152.

Kinnear, T. C., Taylor, J. R., & Ahmed, S. A. (1974). Ecologically concerned consumers: who are they? *Journal of Marketing, 38*, 20–24.

Korpela, K. M., Hartig, T., & Kaiser, F. G. (2001). Restorative experience and self-regulation in favorite places. *Environment and Behavior, 33*, 572–589.

Lee, J., & Holden, S. J. S. (1999). Understanding the determinants of environmentally conscious behaviour. *Psychology & Marketing, 16*, 373–392.

Lynn, M., Kampschroeder, K., & Pereira, A. (1999). Evolutionary perspectives on consumer behavior: an introduction. In E. J. Arnould, & L. M. Scott (Eds.), *Advances in consumer research, Vol. 26* (pp. 226–230). Provo, UT: Association for Consumer Research.

Lynn, M., Pereira, A., & Kampshroeder, K. Consumer behavior & evolutionary ecology. (1998). Paper presented at the Twenty-Sixth Annual Conference of the Association for Consumer Research, Montreal, Canada.

Lyons, E. (1983). Demographic correlates of landscape preference. *Environment and Behavior, 15*, 487–511.

Mainieri, T., Barnett, E., Valero, T., Unipan, J., & Oskamp, S. (1997). Green buying: the influence of environmental concern on consumer behaviour. *Journal of Social Psychology, 137*, 189–204.

Maller, C., Townsend, M., Pryor, A., Brown, P., & Leger, L. (2006). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International, 21*, 45–54.

Maloney, M. P., & Ward, M. P. (1973). Ecology: let's hear from the people. An objective scale for the measurement of ecological attitudes and knowledge. *American Psychologist, 28*, 583–586.

Manrai, L. A., Manrai, A. K., Lascu, D. N., & Ryans, J. K., Jr. (1997). How green-claim strength and country disposition affect product evaluation and company image. *Psychology & Marketing, 14*, 511–537.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.

Merten, K. (1993). Markenwerbung mit dem Thema Umwelt. *Markenartikel, 1*, 39–40.

Messaris, P. (1997). *Visual persuasion: The role of images in advertising*. Thousand Oaks, CA: Sage.

Mitchel, A. A. (1986). The effect of verbal and visual components of advertisements on brand attitudes and attitude toward the advertisement. *Journal of Consumer Research, 13*, 12–24.

Newell, P. B. (1997). A cross-cultural examination of favorite places. *Environment and Behavior, 29*, 495–514.

Orians, G. H. (1980). Habitat selection: general theory and applications to human behavior. In J. Lockard (Ed.), *The evolution of human social behavior* (pp. 49–66). Chicago: Elsevier.

Orians, G. H. (1986). *Ecological knowledge and environment problem-solving. Concepts and case studies*. Washington, DC: National Academic Press.

Orians, G. H., & Heerwagen, J. H. (1992). Evolved responses to landscapes. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 555–579). NY: Oxford University Press.

Park, C. W., Jaworski, B. J., & MacInnis, D. J. (1986). Strategic brand concept – image management. *Journal of Marketing, 50*, 135–145.

Penning-Rowsell, E. C. (1981). Assessing the validity of landscape evaluations. *Landscape Research, 6*, 22–24.

Petty, R. E., Unnava, R. H., & Strathman, A. J. (1991). Theories of attitude change. In T. S. Robertson, & H. H. Kassarjian (Eds.), *Handbook of consumer behavior* (pp. 241–280). Englewood Cliffs, NJ: Prentice Hall.

Plutchik, R. (1980). *Emotions: A psychoevolutionary synthesis*. New York: Harper & Row.

Purcell, A. T., Lamb, R. J., Peron, E. M., & Falchero, S. (1994). Preference or preferences for landscape? *Journal of Environmental Psychology, 14*, 195–209.

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161–1178.

Russell, J. A., & Mehrabian, A. (1977). Evidence for a three-factor theory of emotions. *Journal of Research in Personality, 11*, 273–294.

Saad, G. (2004). Applying evolutionary psychology in understanding the representation of women in advertisements. *Psychology & Marketing, 21*, 593–612.

Saad, G. (2007). *The evolutionary bases of consumption*. London: Lawrence Erlbaum Associates.

Saad, G., & Gill, T. (2000). Applications of evolutionary psychology in marketing. *Psychology & Marketing, 17*, 1005–1034.

Schindler, P. S. (1986). Color and contrast in magazine advertising. *Psychology & Marketing, 3*, 69–78.

Steiger, J. H., & Lind, J. C.. Statistically-based tests for the number of common factors. Paper presented at the Annual Meeting of the Psychometric Society, 1980, Iowa City, IO.

Stone, G., Barnes, J. H., & Montgomery, C. (1995). Ecoscale: a scale for the measurement of environmentally responsible consumers. *Psychology & Marketing, 12*, 595–612.

Stuart, E. W., Shimp, T. A., & Engle, R. W. (1987). Classical conditioning of consumer attitudes: four experiments in an advertising context. *Journal of Consumer Research, 14*, 334–351.

Swenson, M. R., & Wells, W. D. (1997). Useful correlates of pro-environmental behavior. In M. E. Goldberg, M. Fishbein, & S. E. Middlestadt (Eds.), *Social marketing, theoretical and practical perspectives* (pp. 91–109). Mahwah, New Jersey: Lawrence Erlbaum.

Tanner, C., & Wölfing Kast, S. (2003). Promoting sustainable consumption: determinants of green purchases by Swiss consumers. *Psychology & Marketing, 20*, 883–902.

Thornhill, R. (1998). Darwinian aesthetics. In C. Crawford, & D. Krebs (Eds.), *Handbook of evolutionary psychology* (pp. 543–572). Mahwah, NJ: Erlbaum.

Ulrich, R. S. (1977). Visual landscape preference: a model and applications. *Man-Environment Systems, 7*, 279–293.

Ulrich, R. S. (1981). Natural versus urban scenes. Some psychophysiological effects. *Environment and Behavior, 13*, 523–556.

Ulrich, R. S. (1983). Aesthetic and affective response to natural environment. In I. Altman, & J. F. Wohlwill (Eds.), *Human behavior and the natural environment: advances in theory and research, Vol. 6* (pp. 85–125). New York: Plenum Press.

Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science, 224*, 420–421.

Ulrich, R. S. (1986). Human responses to vegetation and landscapes. *Landscape and Urban Planning, 13*, 29–44.

Ulrich, R. S., Altman, I., & Wohlwill, J. F. (1983). *Behaviour and the natural environment.* New York: Plenum Press.

Van den Berg, A. E., Vlek, C. A. J., & Coeterier, J. F. (1998). Group differences in the aesthetic evaluation of nature development plans: a multilevel approach. *Journal of Environmental Psychology, 18*, 141–157.

Van Liere, K. D., & Dunlap, R. E. (1981). Environmental concern. Does it make a difference how it's measured? *Environment and Behavior, 13*, 651–676.

Watson, D., & Clark, L. A. (1992). On traits and temperament: general and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality, 60*, 441–476.

Williams, K. J. H., & Cary, J. (2002). Landscape preferences, ecological quality, and biodiversity protection. *Environment and Behavior, 34*, 257–274.

Wilson, A. (1992). *The culture of nature.* Cambridge, MA: Blackwell Publishers.

Wilson, E. O. (1984). *Biophilia.* Cambridge, MA: Harvard University Press.

Wright, R. (1995). *The moral animal – Why we are the way we are: The new science of evolutionary psychology.* New York: Vintage.