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Neuroscience in Linguistic Patterns of Communication Campaigns for Environmental Sustainability

Neuronauka we wzorcach lingwistycznych kampanii komunikacyjnych o ochronie środowiska w kontekście zrównoważonego rozwoju

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Abstract

Neuroscience is the scientific study of the nervous system and the brain, with the aim to unravel their function. Although the importance of this discipline in the social sciences has been widely discussed (Adolphs, 2009), there are no studies that use this potential for environmental sustainability-related applications. To the author knowledge investigations on environmental problems communication from the linguistic perspective in the context of neuroscience have been scarcely examined. The purpose of this article is to shed light on this gap, indicate the potential of neuroscience in communication campaigns, and highlight the role of linguistics elements as factors enforcing change in human proenvironmental behavior. The author hypostatizes that the future of sustainability efforts must increasingly be seen in a systemic and holistic way and neuroscience should be seen as an alternative remedy for environmental problems. Moreover, the author examines a potential of neuroscience based on linguistic model of communication that could facilitate behavior change in the context of environmental problems and sheds light on relationship between two disciplines: linguistics and the field that investigates unconscious variables that determine human's behavior – neuroscience. This article is a call for action to incorporate findings made in the field of neuroscience in mass communication message design to promote environmental sustainability more effective.

Key words: environmental sustainability, communication campaigns, linguistic pattern, neuroscience

Streszczenie

Neuronauka jest dyscypliną naukową zajmującą się badaniem systemu nerwowego i mózgu, która ma na celu zgłębienie zasad funkcjonowania tych organów. Pomimo faktu, że znaczenie tej dziedziny w naukach społecznych było już szeroko dyskutowane (Adolphs, 2009), kwestia wykorzystania potencjału neuronauki w kontekście ochrony środowiska nie została jeszcze poddana dogłębnej analizie. Zgodnie z wiedzą autorki, kwestia komunikacji o problemach zanieczyszczenia środowiska z perspektywy lingwistycznej w kontekście neuronauki nie została jak dotąd w szerokim zakresie zbadana. Celem niniejszego artykułu jest zwrócenie uwagi na te lukę w badaniach, wskazanie na potencjał neuronauki jako aspektu wpływającego na efektywność kampanii komunikacyjnych i podkreślenie roli lingwistycznych aspektów jako czynników determinujących zmianę w zachowaniu człowieka w kontekście ochrony środowiska. Autorka niniejszego opracowania wysuwa hipotezę, że przyszłe starania zmierzające do osiągniecia zrównoważonego rozwoju powinny mieć charakter systematyczny i holistyczny, a neuronauka powinna być postrzegana jako alternatywne rozwiązanie problemów środowiskowych. Ponadto, w niniejszym artykule autorka bada potencjał neuronauki w oparciu o lingwistyczny model komunikacji, który mógłby w pozytywny sposobów wpłynąć na zmianę zachowania w odniesieniu do problemów środowiskowych, oraz podkreśla związek między dwoma dyscyplinami: lingwistyką i neuronauką – dyscypliną, która zajmuje się nieświadomymi czynnikami determinującymi zachowanie ludzkie. Niniejszy artykuł jest wezwaniem do uwzględnienia wyników badań z dziedziny neuronauki w koncepcie przekazu komunikacji masowej w celu efektywniejszej promocji ochrony środowiska.

Słowa kluczowe: zrównoważoność środowiskowa, kampanie komunikacyjne, wzorzec lingwistyczny, neuronauka

Introduction

Sustainable development that is widely understood as development that meets the needs of the present without compromising the ability of future generations to meet their own needs seems to be nowadays the most comprehensive challenge facing mankind (WCED, 1987). In the last years, environmental change became a critical issue in the debate on sustainable development. Many scholars recognize environmental problems as one of the most serious sustainability risks of the twenty-first century that calls for immediate actions (Nakicenovic & Swart, 2000; Houghton et al., 2001). It is well known that Earth system changes, including rising temperatures, increasing climate variability, increased rainfall in some areas and drought in others, and more frequent severe weather events. These shifts cause many social and health problems. This situation calls for moving beyond additional actions based on short-term pragmatic considerations and toward the development of widespread global actions that are necessary to deal with environmental change (Beddoe et al., 2009; Fisher et al., 2007).

For the past years, most research in the field of environmental management have focused on technology innovation or organizational change (Bazerman and Hoffman, 1999). Recently, we witness growth in number of publications that suggest more holistic approach to this problem (Bazerman et al. 2001; Hoffman and Bazerman, 2007). In this sense, it is necessary to remember that technology or organization-based solutions should be combined with human aspects to be successful (Jabbour and Oliveira, 2011).

Most of environmental problems are human caused. The evidence from this finding points towards the idea that changing individual behavior is central to achieve a sustainable future (McKenzie-Mohr, 2000). Therefore, considering psychological behavior change theories (Peattie and Peattie, 2009) seem to be relevant to achieve a shift in society in the context of proenvironmental behavior (McKenzie-Mohr, 2000).

The importance of influencing behavior to achieve desired positive outcomes is increasingly recognized and has led to several reviews and reports. Some of these cover the use of behavior change models in general (Darnton, 2008) while others focus on behaviors relevant to specific contexts such as climate change (Southerton et al., 2011), sustainable consumption (Jackson, 2005), or the impact of volunteering on environmental behavior (Hine et al., 2008).

The research process is identified into two key phases that are the literature review and the main study. The presented contents are based on the critical literature review regarding communication pattern of environmental sustainability in term of public campaigns and its impact on human behavior. The research was carried out 2017 using keywords: sustainability, sustainable behavior, environmental sustainability, behavior change, and climate change. The sources of information were papers published on international scientific internet platforms as well as data collection platforms.

Psychology and environmental sustainability

Over years many psychologists and sociologists have been arguing for the relevance of psychology to environmental topics and tried to explore the roots of environmental action (Oskamp, 2000; Kazdin, 2009; Swim et al., 2011). The findings show that psychology indeed provides a set of potentially powerful answers to the question what barriers for proenvironmental behavior are. A certain mix of variables drives every human behavior. Focus on behavior rather than on the brain processes has created a broad range of interesting insights that contradict previous theoretical work on the presumably rational motivations of behavior. This is demonstrated with ideas such as prospect theory (Kahneman and Tversky, 1979), and nudging (Thaler and Sunstein, 2009). The growing interest in psychological roots of environmental degradation was demonstrated in conception of environmental psychology- the science exploring the connections between environmental attitudes and pro-environmental behaviors (Kahneman and Tversky, 1979).

Cvetkovich and Wener (1994) argue that psychology applied to issues of relationships between human and environment can contribute in important ways to evaluating and shaping environmental policy as well as generally increasing awareness of the connection of humans to their physical environment. According to Kollmuss and Agyemann (2002) the answer to the questions what are motives for people to act environmentally and what are the barriers to proenvironmental behavior seems to be is extremely complex. Both authors suggest that achieving proenvironmental behavior change is a very complex process including: environmental knowledge, values, attitudes, and action. This complexity is embedded in personal values and shaped by personality features and other internal and external determinants.

Communication and Human Behavior

As stated above, climate change is an extremely complex issue that has exercised the minds of experts and policy makers with renewed urgency in recent years. It has prompted an explosion of writing in the media, on the internet and in the domain of popular science and literature. It seems that media have evolved into a powerful actor in the production, exchange, and dissemination of proenvironmental ideas within the science, policy, and public spheres. Many attempts have been made to investigate the

role of communication in the behavior change process. In their groundbreaking papers of Schoenfeld (1979); Spector and Kitsuse (1977) points out that the mass-media are key actors in the identification and interpretation of environmental issues and it plays a key role in shaping the terrain where people may be galvanized into action (Bord et al., 2000). This approach is also supported by Gardner and Stern (2002) who define communication as an instrument to alter environmental behavior that influences important variables responsible for decision making process that are attitudes, beliefs, personal norms, and social context. Rothman and Salovey (1997) proposed strategic application of persuasive communication by tailoring and framing messages to affect behaviors and to shape how people construe behaviors. According to Van (2014) the way that people perceive and process information and organize their knowledge can have a significant impact on their behavior. Pelletier and Sharp (2008) claim that an intervention using persuasive messages is the first step in efforts to encourage individuals to change specific behavior.

Building on these findings, the author of this dissertation concludes that communication seems to be an essential key in unlocking the potential for positive change in the direction of a proenvironmental behavior.

As reported above, increasing attention has been paid in recent years to the ways in which the environmental change is reported in the print media. However, although there is an extensive literature on green media, limited research has investigated communication strategies for attaining more effective environmental message transfer. This gap was signalized in research papers of Davis (1993), Obermiller (1995), Schuhwerk and Lefkoff-Hagius (1995), Chan and Rau (2004), Hartmann and Apaolaza-Ibanez (2009), Leonidou et al. (2011).

Trumbo (1996) traced the influence of the news media in the framing of climate change and in shaping discourses about climate change. A thorough analysis of the influence of the journalistic norm of bias in the coverage of global warning in the press was undertaken by scientists Boykoff and Boykoff (2004). Carvalho and Burgess (2005) and Smith (2005) critically examined the role of the media in constructing public perceptions of climate risk. Presented investigations contribute to the wider discourse on how environmental change risks are constructed by multiple public audiences and how these constructions translate into individual or collective action (Lorenzoni et al., 2005).

As stated at the beginning of this paper, the author's intention is to present how the findings in neuroscience may be applied in mass communication campaigns to achieve alterations in human behavior. Among various channels of mass communication, the author claims that public campaigns are appropriate subjects for further investigations on this field. Other mediums of mass communication including advertising are not the subject of this research paper. However, for further research reasons it is important to distinguish these two tools. The reason the author will not elaborate on advertising as a potential instrument for behavior change is that advertising by itself and in contrast to public campaign focuses on feelings and perceptions towards products and does not lead to attitude change. Moreover, advertising is based on the idea of satisfying desires and wants and tries to stay with the tide of public opinion wants. Finally, it will not result in fundamental changes in behavior. Public campaigns, on the contrary are an attempt to shape behavior toward desirable social outcomes (Weiss and Tschirhart, 1994). They may not be in line with prevailing attitudes and opinions, and it is usually difficult to specify individual desires and wants. In advertising, a personal, short term outcomes and rewards are usually easy to see, and outcomes can usually be quantified, whereas in campaigns the outcomes and reward are not instant and difficult to see. Finally, campaigns usually relate to a social concern while advertising concerns slight modifications. Thus, the author indicates public campaigns as a channel of mass communication and an instrument accelerating behavior change.

Already in early 20th century E. Sapir (1921) came to conclusion that description of the structure of a language and its function in speech might help to explain the processes of perception and cognition in humans and provide a better insight into human behavior. Benjamin Lee Whorf, under the influence of Sapir, hypothesized that the structure of a language may influence the way a person conceives and perceives the world (Wardhaugh, 2002). In this context, also communication can be classified as a source of enabling factors that affects the process of behavior modelling. Communication scholars who have reviewed the communication campaigns literature, have tended to reach similar conclusions that mass media interventions, by themselves or in combination with other programs, can significantly influence the behaviors of populations (Rogers and Storey, 1987). Lewitt, Coate, and Grossman (1981) for example concluded that youth smoking rates were reduced by messages broadcast on radio and television. However, the effects of communication campaigns are typically only modest in size. Even though there are clear exceptions to this rule—i.e., campaigns that have had dramatic behavior change impacts (Holder and Treno, 1997) as well as campaigns that have had no behavior change impact — the rule itself applies to a broad range of public media campaigns.

Mass media campaigns have long been a tool for promoting certain behavior being widely used to expose high proportions of large populations to messages through routine uses of existing media, such as television, radio, and newspapers. The great promise of mass media campaigns lies in their ability to dis-

seminate well defined behaviorally focused messages to large audiences repeatedly, over time, in an incidental manner, and at a low cost per head. Mass media campaigns have generally aimed primarily to change knowledge, awareness, and attitudes, contributing to the goal of changing behavior. As a change in behavior is the highest priority in any public campaign, however, most of the mass media change knowledge and awareness more easily than behavior.

Generally, the behavior change is influenced by motivation from others (external influence) as well as through internal influence. The literature points to the following individual-level factors as being predictive of health behaviors: cognitions (e.g., knowledge and beliefs, self-efficacy, and outcome expectancies) (Bandura, 2004), emotions, skills (Brown and Eisenberg, 1995), motivation, and intentions (Fishbein, 2000). Biological predispositions (e.g., sensation seeking and demographic factors (Marmot et al., 1991) are additional individual-level factors that may be used to stratify audiences and target messages. Mass media campaigns have sought to influence these factors for their own sake, and to change behavior.

Mass media campaigns can work through direct and indirect pathways to change the behavior of whole populations. Many campaigns aim to directly affect individual recipients by invoking cognitive or emotional responses. Such programmes are intended to affect decision-making processes at the individual level. Anticipated outcomes include the removal or lowering of obstacles to change, helping people to adopt healthy or recognize unhealthy social norms, and to associate valued emotions with achieving change. These changes strengthen intentions to alter and increase the likelihood of achieving new behaviors.

Behavior change might also be achieved through indirect routes. First, mass media messages can set an agenda for and increase the frequency, of interpersonal discussion about a particular issue within an individual's social network, which, in combination with individual exposure to messages, might reinforce specific changes in behavior. Second, since mass media messages reach large audiences, changes in behavior that become norms within an individual's social network might influence that person's decisions without them having been directly exposed to or initially persuaded by the campaign.

Effective public mass media campaigns typically have two important qualities: they feature well-designed messages, and those messages are delivered to their intended audience with sufficient reach and frequency to be seen or heard and remembered (Hornik, 2002). The science on effective mass message design continues to develop. Hornik (2002) noted that the public communication field has been perhaps too focused on issues of message design and not adequately focused on the more costly challenge associated with achieving sufficient levels of message exposure among members of the target audience. The actions promoted by the campaigns also vary, ranging from messages related to abstinence or moderation to more specific behavioral recommendations. Decisions related to message content are generally made based on the opinions expressed by experts or focus groups rather than on evidence of effectiveness in changing behavior. Another aspect of message content relates to the optimal amount of anxiety produced. The effectiveness of fear-based campaigns is the subject of a long-standing controversy. Some level of anxiety arousal is generally seen as a desirable motivator. However, several authors have cautioned that generating intense anxiety by emphasizing the severity of a problem and the audience's susceptibility to it can cause some people to ignore or discount the campaign messages. Although this caution appears to be justified, increasing the strength of a fear appeal also increases the probability that the audience will change their attitudes, intentions, and behaviors. These changes are maximized, and defensive avoidance minimized, when the anxiety-arousing message is accompanied by specific information about actions that people can take to protect.

Even though mass media campaigns are used extensively, considerable debate continues over their effectiveness. As changing behavior is the highest priority in any public campaign, however, most of the mass media will change knowledge and awareness more easily than behavior. Theoretically, the mass media are supposed to be most effective in achieving awareness. The literature is beginning to amass evidence that targeted, well-executed mass media campaigns can have small-to-moderate effects not only on knowledge, beliefs, and attitudes, but on behaviors as well, which can translate into major public impact.

However, various hindrances to the success of mass media campaigns exist. Exposure to mass media messages is generally passive (Wakefield et al., 2010) and such campaigns are frequently competing with factors, such as pervasive product marketing, powerful social norms, and behaviors driven by addiction or habit, exposure of audiences to the message might not meet expectations, hindered by inadequate funding, the increasingly fractured and cluttered media environment, use of inappropriate or poorly researched format (e.g., boring factual messages or age-inappropriate content), or a combination of these features. Moreover, persuasive marketing for competing products or with opposing messages, the power of social norms, and the drive of addiction frequently mean that positive campaign outcomes are not sustained. The careful planning and testing of campaign content and format with target audiences are, therefore, crucial.

Changes in audience behavior are frequently achievable, and it is important for the campaign planner to

set modest and realistic expectations about what can be achieved. A promotion campaign might be considered successful or effective if about five percent of the target audience does adopt measurable changes in health behavior over the longer-term (Rogers and Storey, 1987).

The above findings show that providing people with information and teaching them how they should behave does not always lead to desirable change in their behavior. However, when there is a supportive environment with information and communication then there is a desirable change in the behavior of the target group. Thus, an instructional intervention which has a close interface with education and communication need to be implemented. It is a strategic and group-oriented form of communication to perceive a desired change in behavior of target group. However, it is not as easy as it sounds, as there is no one-size-fits all strategy for any intervention.

Moreover, reviews of the public communication literature are limited in an important way. Most of what we know about the potential of public mass campaigns comes from campaigns that sought to influence population behavior by targeting individual-level antecedents to the behavior of concern (such as knowledge, perceptions, and self-efficacy). As such, extant literature reviews can reveal only a constrained view of the potential of public health communication. A more complete view-one that is more in line with contemporary thinking in public-requires that we gain an understanding of mass media campaign potential across the full range of factors.

There is a general perception that mass media campaigns are most likely to reduce undesired attitudes if other efforts reinforce their messages. Reinforcing factors may include law enforcement efforts, grassroots activities, and other media messages. While there is universal agreement that the design of public communication campaigns needs to improve, there is not complete agreement about what direction it should take. Some argue that the field needs to focus on more rigorous evaluation that delivers information on cause and effect. Others argue that evaluation needs to be more practical and process-oriented.

Quite recently, considerable attention has been paid to the role of language itself in shaping desired behavior. This was demonstrated in many scientific discourses surrounding climate change: Corbett and Durfee (2004); Patt (2007) investigated the ways scientific uncertainties are contextualized, communicated, and understood. Linder (2006) argued the use of semiotics in advertising. A lot of attention was also given to the use and power of linguistic metaphors which is demonstrated in works of e.g. Moser & Dilling (2004); Nerlich (2009) and novel terms (Thelwall and Nerlich, 2010).

There is also emerging a vigorous debate about the efficacy of scientific language in communication strategies. In a variety of papers and initiatives scientist are urged to adapt their language to suit the tastes, meanings, and concerns of ordinary people as they are said to employ a lexicon of caution and speak in a language of probability, which usually does not translate smoothly into the unequivocal messages that are valued in the press (Weingart et al., 2000). According to Hassol (2008) scientific communications on environment change are formulated the way that use words that mean something very different too much of the public. Therefore, scientific findings usually require translation into language that is more comprehensive to laypeople.

Another approach to the issue of proenvironmental behavior from a linguistic perspective is represented by Jill Ereaut and Nat Segnit (2006). In the report The *Warm Words* the authors examine different storylines called linguistic repertoires and suggest that these storylines shape the way in which public perceptions about climate change is developed. Moreover, there is still considerable ambiguity regarding efficacy of a discourse of catastrophic climate change (Ereaut and Segnit, 2006; Risbey, 2008). Scholars draw our attention to the fact that most of current environmental communication strategies evoke negative feelings like fear, guilt, or shame appeals, in order to highlight the urgency of the communicated issues. Although fear and risk communication research typically find that people must feel personally threatened for messages to influence behavior (Moser and Dilling, 2011) the climate change literature contains frequent warnings to avoid fearful messages (Moser, 2007). As a result, fear-based communication strategies raise no interest or concern at all (Moser and Dilling, 2011; O'Neill and Nicholson-Cole, 2009) and frequently fail in achieving desired behavioral outcomes (e.g. Nicholson-Cole, 2005; Lorenzoni et al., 2007).

Several communication studies therefore, point out that communicators of climate change should aim to achieve meaningful engagement in all three facets: understanding, emotion, and behavior. This calls for exploration in the field of cognitive barriers to individual engagement with climate change. Over years psychologists and scientists have explored factors that can affect individual decisions and public opinion on climate policy. Thus, they point to the relevance of emotions (Lorenzoni et al. 2006; Wolf and Moser 2011), cultural cognition (Kahan et al., 2011), ideologies (McCright and Dunlap, 2000; Weber, 2010), communicative strategies, and the individual experience of climatic events (Dessai et al., 2004; Spence et al., 2011).

Neuroscience and human behavior

All of above presented findings lead to conclusion that individual decision-making is not as much conscious as it was supposed and thus the model of *homo economicus* seems to be already outdated. The conclusion that reasoning cannot be regarded as ra-

tional anymore (Bechara and Damasio, 2005) resulted in increased attention paid to emotions and unconscious processes that influence human behavior (e.g. Camerer et al., 2005; Oehler and Reisch, 2008). Due to this new approach, in the past few years we witness growing interest in neuroscience that seems to provide a set of potentially powerful answers to the question on what are those unknown unconscious variables that determine human's behavior.

There is certain proof indicating brain as the main determinator of human decision-making process (Murphy et al, 2008). Moreover, some results show that in most cases, people are unable to express their reasons for certain behavior (Vecchiato et al., 2011). Thus, it seems that the argumentation by Kenning and Plassmann (2005) seem to be correct. Both authors claim that neuroscience takes neural processes as the basis for the explanation of human behavior.

Neuroscience explores decision-making variables that are related to unconscious and are processed in an automated form (Martin and Morich, 2011) and thus tries to understand human behavior (Esch et al., 2008; Kumlehn, 2011).

Based on this approach, the author of this dissertation suggests that the knowledge that has been generated in the field of neuromarketing may be used in communication strategies related to environmental issues, as the search for explanations of neuroscience to understand the process of decision making can bring new perspectives for environmental problems. The greater understanding of how to increase the emotional engagement of people in favour of sustainable decisions is one of these possibilities. Understanding whether environmental messages in mass media are effectively being successful or failing in reaching their awareness goals are examples of these new research lines for sustainability.

In the light of the above discourse the author of this dissertation hypothesizes, that from the neuro-perspective people have an instinctual reaction to words and language. The key is to recognize which words will elicit the desired reaction, depending on the target group. Building on recent advances in the cognitive sciences as well as on rapidly evolving technological support tools for studying the mind, a neuro science approach promises new insights that could increase humans' ability to shape the necessary social change in the transition to a sustainable future. This approach implies that neuroscience can fill the gap of environmental knowledge awareness transferred in messages and the right decisions in benefit of the proenvironmental behavior.

Discussion

As reported above, social development as well as the protection of environmental resources are areas of growing importance for consumers, businesses, governments, and the society at large (e.g., Grinstein and Nisan, 2009; Menon and Menon, 1997; Peattie and Peattie, 2009) which prompt wide discourse in scientific literature and mass media. This media-boom leads to situation when communication channels are oversaturated with information-based messages on environmental change and the possible actions to prevent further environment deterioration. However, many findings showed that enhancing knowledge and creating supportive attitudes often has little or no impact on behavior change. Several surveys indicate that people are well informed and aware of the ecological danger that is around us. According to Ockwell et al. (2009) existing communication approaches often fail to meaningfully engage, as they do not consider the holistic aspects of proenvironmental behavior.

Although growing interest in the relationship of personality variables and consumer behavior is demonstrated in plenty of papers, past attempts to understand and predict human behavior using personality variables have resulted in disappointing results (Kakkar and Lutz, 1981). Many researches showed that individual decisions depend in 80% on unconscious behavior. Scholars observed that research examining personality effects on human behavior was often conducted without the guidance of general theoretical frameworks. As a result, little understanding of the processes by which a personality variable ultimately influenced preferences or behavior has been gained. Thus, it could be concluded that even if there are intense and well-structured awareness campaigns related to environmental problems, they may not be effectively reaching the proposed objectives, as they would not influence the decision and be changing deeply rooted unconscious variables.

To sum up, although there are many publications on research strategies to motivate people to act proenvironmental, and many proenvironmental change intervention have been implemented so far, we could question the extent to which the field is moving forward as numerous theoretical frameworks have been developed to explain the gap between the possession of environmental knowledge and environmental awareness and displaying pro-environmental behavior. Although many hundreds of studies have been undertaken, no definitive explanation has yet been found

Some of these insights lead to the conclusion that there are fundamental internal and unconscious obstacles to climate action: people might simply do not change, even if they are fully informed about the problem and aware of the different perspectives regarding the problem and its solution. This raises questions about the effectiveness of current communication efforts, and the ability of their audiences to implement change in response to these communications. Moreover, research findings have showed that some of the traditional communication strategies used to motivate people can result in proenvironmetal behavior change (Bamberg and Moser, 2007). However, these have only short-term effect -a long-

term maintenance of these behaviors has been a rocky problem. People seem to react favorably to the strategies initially, but their behavior declines over time, and more importantly, behavior returns to baseline if the source of motivation is withdrawn (Lehman and Geller, 2004). The immediate strategies for consumers to change their behavior are often reported to be weak or nonexistent (Osterhus, 1997). Several scholars signalize existence of a gap between environmental knowledge and awareness which is demonstrated in media, and active behavior change (e.g. Kollmuss and Agyeman, 2002; Tobler et al., 2011). Attempts to answer the question on how to fill this gap have drawn upon social and behavioral psychology (e.g. Lowe, 2006; Leiserowitz, 2006) and the communication sciences (e.g. Nicholson-Cole, 2005; Moser and Dilling, 2007). It seems that not only the persuasiveness of the messages, but also the more alternative/holistic approaches to communication are needed to determine the variables that influence the behavior change.

The discussion about the use of brain science outside the health care system is gaining prominence. Advances in neuroscience raise ethical, social, and legal issues in relation to the human person and the brain. Nowadays there are many businesses offering neuroscientific methods under the umbrella term neuroscience. However, one should not lump everything that is related to brain science together. There are purely academic studies try to develop and derive recommendations for practical fields. It is to highlight that debates over neuromarketing tend to lack a differentiation between scientific and commercial for-profit applications. Especially in the public ethical discussion, it is important to distinguish academic studies that use neuroscientific methods from those purely for the purposes of commercial marketing. It is not taken into consideration, that scientific studies often focus on the consumer's point of view, while commercial ones try to apply findings to sell a product.

Conclusion

It can be concluded that the future of sustainability efforts must increasingly be seen in a systemic and holistic way and neuromarketing as an alternative remedy for environmental problems is the best example. Advances in neuroimaging technology have led to an explosion in the number of studies investigating the living human brain, and thereby our understanding of its structure and function. The insights of neuroscience are only just becoming available for the study of mass communication. Thus, the author of this article claims that the findings made in the field of neuroscience should be incorporated in the process of the mass communication message design. Further research on the relation of these two fields and its ethical aspect is needed.

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