Forest Policy and Economics 56 (2015) 20–26

Contents lists available at ScienceDirect

Forest Policy and Economics

journal homepage: www.elsevier.com/locate/forpol

Expert and novice group differences in eye movements when assessing biodiversity of harvested forests

Johan Pihel [a,*], Åsa Ode Sang [c], Caroline Hagerhall [b], Marcus Nyström [c]

[a] Department of Landscape Architecture, Planning and Management, Swedish University of Agricultural Sciences, Alnarp, Sweden
[b] Department of Work Science, Business Economics and Environmental Psychology, Swedish University of Agricultural Sciences, Alnarp, Sweden
[c] Humanities Laboratory, Lund University, Lund, Sweden

ARTICLE INFO

Article history:
Received 5 August 2014
Received in revised form 13 April 2015
Accepted 17 April 2015
Available online 5 May 2015

Keywords:
Forestry
Eye tracking
Expert novice study
Landscape assessment
Tree retention
Ecological assessment

ABSTRACT

The European Landscape Convention encourages everyone to be part of the management and perception of the landscape. In Swedish forestry today, however, it is experts in biodiversity who are responsible for the management policies used when planning tree retention as a biodiversity conservation strategy. This gives the forest a certain structure, but it is uncertain whether this structure is felt to represent the same biodiversity when assessed by novices rather than biodiversity experts. Using eye tracking and subjective assessment scales, the present study investigates whether biodiversity expertise has an effect on biodiversity rating and its certainty, fixation durations, and dwell times in the field layer in the foreground when assessing images of recently logged forest that has some degree of tree retention. The results show no significant difference in the assessments of the images between the two groups; however, the certainty assessments and the eye-tracking data suggest that there are differences in strategies and behaviour. The findings have implications for the interpretation of self-reported data corresponding to measured behaviour when judging the biodiversity of a forest landscape. The study suggest that there could be differences between user groups that previous studies miss out on, and that eye tracking as a method could help detect these differences.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

When investigating human behaviour it is important to know what people perceive and how they assess the information provided by their environment. Not only will this give us a better idea of what constitutes the basis for human evaluations of their environment, but it will also give us an idea of how they interact with the environment when making decisions. This is reflected in the European Landscape Convention (ELC) ratified by Sweden among others on 11 November 2010, which states that "landscape" means an area, as perceived by people (Council of Europe, 2000, art. 1a), with perception being the central word in the formulation. With the perception of landscape being essential to the ELC, it behoves us to understand the mechanisms by which policies and management influence perceptions of landscape, and whether this alters as policies alter. Among the many types of landscape that are heavily influenced by policy and human action are forests.

Today's Swedish forest landscape has no areas unaffected by human action. Most common is the effect humans have had on carbon supply in the atmosphere and in forests due to land-use change and the use of fossil fuels over the last couple of centuries (Watson et al., 2000). While there are likely long-term impacts on forests from changes in carbon supply, the most visible consequences come in the shape of physical action relating to harvesting and thinning. It is rare for any of this to be conducted with the perception of forests in mind, but rather the economic benefit of the action. The focus on the economics of the moment is evident when examining Swedish forestry legislation; for example, a forest parcel is not allowed to fall below a certain amount of standing volume.

As awareness of biodiversity grew in the twentieth century, the political demands to preserve diversity grew. In 1993, Sweden ratified the UN Convention on Biological Diversity (CBD). This meant that there was now a legal obligation to maintain the Swedish forests' biodiversity (United Nations, 1993).

In Sweden, one tried and tested method for meeting the biodiversity goals listed in the CBD is the use of variable tree retention as part of standard thinning and cutting operations. Tree retention means the retention of areas of standing trees in order to support biodiversity (Skogsstyrelsen, 2009). These areas contain single trees or groups of trees and are often placed in economically less valuable production areas within a given harvest. Typically, these areas are selected to contain tall stumps, dead wood, and live rare trees. A recent review of the Nordic literature showed that tree retention is supporting species dependent on disturbance, for instance dead trees left standing in the open, exposed to the sun (Gustafsson et al., 2010). The review also showed that this method can lessen some of the negative consequences

* Corresponding author at: P.O. Box 58, S-230 53 Alnarp, Sweden.
E-mail address: Johan.pihel@slu.se (J. Pihel).

http://dx.doi.org/10.1016/j.forpol.2015.04.004
1389-9341/© 2015 Elsevier B.V. All rights reserved.

of clear-cutting by providing habitats for some refugee species from the felled mature forest.

While their role for different species has been researched (for a survey of the field see Gustafsson et al., 2010), only a few studies have investigated the human experience of more general ecological values and the visual impact of the design of these harvests. Ribe (2006) used methods from economics and political science to look at people's acceptance of forestry actions, and found that the acceptability of various forms of forest management correlates to the care taken to preserve wildlife and certain socio-economic aspects. Acceptance in this case is a composite measure with perceptive, cognitive, and emotional components.

When it comes to the choices made on the ground—which trees to spare, the detailed plan for each retention area—it is normally up to the person driving the harvester. The harvester drivers in Sweden are given a short education in forest biology and ecology. The length of the training differs between companies, but it is part of the drivers' introduction to the company, and not a stand-alone certification. The course is most often led by a person with a formal qualification in biology or ecology. The results are debated, however, both in the composition and the actual biodiversity of the landscape are debated, while in the case of biodiversity they depend more on other factors (such as the chosen species of retention trees) than on how retention is practised (Rosenvald and Lõhmus, 2008; Söderström, 2009). Procedures that leave dead wood to enhance biodiversity as a retention strategy are of the utmost importance, since it is forest ecosystems that provide a habitat for a large number of species (Jonsson et al., 2005).

The regulations designed to preserve biodiversity have been in place for almost twenty years, during which time they have had a chance to impact the perception of forest landscapes, yet even so we do not know exactly what that impact may have been. While there are plenty of studies looking at preferences and aesthetic judgements of landscape images (for example, Hagerhall, 2000; Meitner et al., 2005; Purcell et al., 2001; Ribe, 2005; Silvennoinen et al., 2001; Wherrett, 2000), very few studies have focused on the more specific cognitive perceptions and assessment of biodiversity. Other studies use the willingness to pay paradigm to explore values connected to the ephemeral aspects of forests (see for example Rekola and Pouta (2005) and Scarpa et al.(2000)). The use of the willingness to pay paradigm is useful when translating the informal values into formal currency values, but the method is hard to adapt to get insight into how and why the evaluation is made. There have been studies that use ratings of ecological values or biodiversity compared to other landscape services, where ecological values have been found to be highly rated by various types of stakeholders (Ribe, 2006; Sheppard and Meitner, 2005). When it comes to preference studies there are several well-known and cited studies connecting preference of landscape and inherited values, either genetically or culturally, that point to that certain “type of landscapes” that are more preferred than others (Orians, 1986; Bourassa, 1988; Kaplan and Kaplan, 1989; Ulrich, 1993, to name a few). These theories do however discuss preference from a broader, whole-population point of view, stipulating that the aesthetic preference is genetically coded or otherwise uniform in these aspects for the whole population. With the present study, we wish to understand the differences that could appear from expertise. Gobster et al. (2007) worked out a conceptual model for the human aesthetic interaction with the surroundings. Even if Gobster et al. (ibid) are equally focused on the aesthetic aspect of human preference, they do acknowledge the social and cultural input in the assessments made by people, and that they could make a difference and provide support for the preference assessments. Fry et al. (2009) presented a set of visual indicators that could link the visual perceptions to the ecological indicators. This would in itself have as a prerequisite that differences in ecological knowledge would reflect in differences of visual perception and we build upon this to investigate if the differences go even deeper in behaviour than that.

There is also an ongoing discussion about the implicit connections between human preference and biodiversity. Johansson et al. (2014) used QEEG (quantitative electroencephalograms) and a questionnaire to assess participants' attitudes towards environmental conservation and found a relationship between brain activity and images of low, intermediate, and high biodiversity, where, going by the high level of activity in the frontal right hemisphere of the brain, participants found intermediate biodiversity the most important to conserve. Purcell and Lamb (1998) and Hagerhall (2001) discuss whether tacit representations of landscape and the unconscious recognition of human-induced alterations in the environment might affect preferences. In the case of forest management, this could lead to situations where an action or policy is interpreted differently by different groups, yielding different responses.

Meanwhile, a recent study showed no significant relationship between a knowledge of forest management and personal preferences for scenes of forest regrowth, while there was a strong relationship between preferences for forest scenes and the respondents' attitudes toward forest management (Kearney and Bradley, 2011). Rogge et al. (2007) found in their literature review that landscape experts often make affective and cognitive assessments of landscape that are nothing like those made by the people actually living there. They point out that it is often the experts who have a greater say in landscape management and planning.

Different groups use and interact with the environment differently, and this affects how they assess the landscape. Dramstad et al. (2006) found that, when presented with photographs of rural landscapes and the geographical characteristics of the area that were part of the photos, the opinions of groups of local inhabitants differed considerably from those of students with other origins. Taking the complete dataset, there was a significant correlation between preference and land cover diversity, yet when split up by group, the locals did not show any correlation between preference and land cover diversity (Dramstad et al., 2006). These results can be interpreted as meaning that locals and non-locals assess landscape photographs using a combination of the available visual geographical information, previously acquired knowledge, and personal values to draw conclusions that lead to their assessment of the places shown in images. Other studies of rural landscapes have shown that there are group differences when rating and assessing landscapes' scenic beauty, functional preference, or other aspects such as complexity or naturalness. These differences could be explained by the respondents' professional background or recreational relationship to the landscape (Ode Sang et al., 2009; Petucco et al., 2013; Van den Berg et al., 1998; Winter, 2005).

Research on people's attitudes towards dead wood shows that it is sometimes considered messy and undesirable (Lindhagen and Hörnsten, 2000). This effect is somewhat decreased if informants know of the benefits of leaving dead trees and woody debris in forests (Brunson and Reiter, 1996; Tahvanainen et al., 2001; Tyrväinen et al., 2003; Tönnes et al., 2004; Williams et al., 2007). Many studies have found that people tend to have very low preference scores for harvested areas. The size and shape of the harvested areas can influence preferences (Karjalainen and Komulainen, 1999; Lindhagen and Hörnsten, 2000; Ribe, 1989, 2005) in the sense that an organic, less formal shape of the harvested area is more preferred.

1.1. Eye tracking

Eye tracking is a well-established method long in use in fields such as psychology, medicine, psycholinguistics, and the cognitive sciences (see Holmqvist et al., 2011). Eye movements are closely connected to where our visual attention is directed (Deubel and Schneider, 1996), in particular when viewing complex stimuli material such as a photograph of a real-world situation. Eye movements are also heavily dependent on what task the participant is asked to perform (Buswell, 1935; Hayhoe and Ballard, 2005; Yarbus, 1967). The manner in which the

Download English Version:

https://daneshyari.com/en/article/91370

Download Persian Version:

https://daneshyari.com/article/91370

Daneshyari.com