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Exploring Criteria in Forest Aesthetics: Rough Sets Theory and Discourse Analysis

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Contents

Abstract

This paper explores the public criteria of forest aesthetics and proposes a new approach. The material in focus consists of prize-winning photos of trees and forests from contests in central Europe (Switzerland and Germany). The primary objective of the paper is to challenge the underpinning norms in forestry science. The norm is that scientists have conventionally presumed criteria and biased factors when asking forest aesthetic preferences. Most existing studies have predetermined categories, which have been biased toward the investigator's expert knowledge and underlying purposes. The style has been predominantly based on the idea: "Choose from what we (scientists) have chosen!"

In order to examine the categories of forest aesthetics in a more unrestricted manner, interviews were conducted at IIASA involving members of the academic staff, participants of the Young Summer Scientists Program, as well as members of the non-academic staff. The interview consisted of three phases: (a) dead wood preferences, (b) main categorizations, and (c) familiarity questions. The interviews conducted began with six pictures of dead wood shown to the interviewee with questions probing for personal preferences and general impressions. Thereafter, the interviewees were asked to categorize 36 pictures into groups based on their personal knowledge and preferences. In addition to the grouping of the pictures, three key words for criteria and reasons for forming each group were collected to assess the rules used and tendencies for grouping. Lastly, interviewees were asked to speculate on the location or broad geographical area in which the pictures were taken. Interviewees were also asked to identify pictures or groups of pictures, which they felt most familiar with or reminded them most of "home".

The initial results derived from about 50 interviews are presented and discussed in this paper. Both a quantitative approach and a qualitative approach were applied in order to analyze the data. Using rough sets theory, an attempt to form grouping rules with the reasoning words was made. In this process, it was necessary to drastically reduce the number of words included in the analysis (from over 400 words to 12 words) for practical purposes and ease of implementation. Even after this process, the result was negative, suggesting that categorization rules were varied and no clear rules were found. Apart from the relative size of the data set, the degree of freedom appeared to have been too large. Having said this, the rich collection of words contributed by interviewees served as an initial step towards examining the criteria and categories of forest aesthetics formed by the public. It is evident that many aspects of public attitude towards forest aesthetics remain to be further examined. Therefore, possibilities for further studies are elucidated in the final section of this paper.

A shortened version of this paper is being prepared for submission to the journal *Landscape and Urban Planning*. As the paper is part of ongoing work, the results and future tasks sections are brief and the results are not final.

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Ryo Kohsaka found that working together with a first-caliber computer intelligence scientist, Krzysztof Dembczynski (also a YSSP participant assigned to IIASA's Risk, Modeling and Society project), a pleasant and academically fruitful cooperation. Ryo also prays for the repose of the deceased Mr. Hojoh, who looked after him and sadly passed away during the summer of 2002.

About the Authors

Ryo Kohsaka was a participant in IIASA's Young Scientist Summer Program (YSSP) during the summer of 2002 and was assigned to the Forestry project, under the supervision of Michael Obersteiner. He graduated in international agriculture for rural developments from the University of Tokyo in 1996, and joined REC in Budapest as project officer in Public Participation. He received his M.Sc. degree from the University of East Anglia, England, in 1999 and from the University of Tokyo in 2000. In 2004, he completed his Ph.D. at the Institut für Forstökonomie, Albert-Ludwigs Universität Freiburg, and his thesis was titled "Contests of Natural Beauty" that applied group-basis interviews to the same material in this report.

Krzysztof Dembczynski was also a YSSP participant in 2002 assigned to the Risk, Modeling and Society project. He graduated in computer science from Pozna University of Technology (PUT). In 1999, he obtained his Bachelor degree and started his Master studies in the area of Intelligent Decision Support Systems. During his studies, he spent two semesters at Cottbus University of Technology where he participated in a DAAD Scholarship program. In 2001, he received his M.Sc. degree and is currently working on his Ph.D. in the Laboratory of Intelligent Decision Support Systems at PUT. His research interests cover machine learning and decision support systems, particularly the rough set approach.

Exploring Criteria in Forest Aesthetics: Rough Sets Theory and Discosurse Analysis

Ryo Kohsaka and Krzysztof Dembczynski

1 Introduction

1.1 Aim

This paper aims to explore the categories and criteria of forest aesthetics in a relatively open and unrestricted manner. By giving interviewees a high degree of freedom in grouping and reasoning, it is aimed to define a "taxonomy" or categorizing system in aesthetics of forests in cultural representations. This is of special importance, since most existing works on landscape and questionnaires on forest preferences are based on (presumably) scientific taxonomy. There is a need to explore the aesthetic judgments of the public, before asking them whether they prefer forest pictures with "light thinning" or "heavy thinning" forest harvesting practices. The purpose is not to dismantle the overall picture formed of aesthetics judgments by the public, nor is it to ignore prediction models that utilize trends and quantitative rules. The resulting data are aimed to provide materials that initiate such discussions, pursuing complex matters, such as the grouping patterns of pictures.

As a contribution to social theory, the entire process is analyzed when cultural and social meanings are being attached to the forest space. In this case, data on public preferences were collected based on perceptions of forest images portrayed in prize-winning photos. The primary assumption of this paper is that prize-winning photos constitute an effective way of approaching contemporary icons of forests, since the pictures are aimed at the general public with severe selection and evaluation by a jury. Understanding public perceptions of forests has a direct connection to current forest sciences, consistent with their need to explore the demands, preferences and general impressions of the public for the forest. However, public perceptions of the forest are often conflicting and even contradictory. In the following section, the background concerning the role of forestry institutions is described. As a general tendency, research in forestry sciences has been lagging in their attempt to systematically explore public reactions to different cultural representations of the forest. Compared to *in situ* public questionnaires of forests, research that is related to representations of forests is pre-framed by the researchers or limited to certain works by professional artists. The originality of this paper lies in the fact that photos here are produced from the general public. This public input is interesting and timely, as interactions and communications with the public are high on the agenda of forestry institutions. The significance of the

explorations in forest aesthetics even reaches the political stage, where "our forest" image of community is (re-)produced.

1.2 Background: Changing Role of Forestry Institutions

If we look back into history, it is not a new phenomenon that social demands for forests are ever changing. According to Schmithüsen *et al.* (1997), industry expansion in the 1950s as well as economic growth in the 1960s has both changed the demands for forests in Europe. In the 1950s the regeneration of people's economic well-being was highlighted, while in the 1960s environmental issues and the ecological movement were in focus. The changes since the 1990s to the present, however, are not just limited to the changing demands for forests. There has been a sea of change in the decision-making process. The involvement of the public has become a new mandate for forestry institutions, especially in recreational matters. In recent years, recreational demands for forests from society have gained much attention. For example, an increasing number of mountain bikers and joggers are witnessed in the forests. The German environmental ministry is eager to attract the younger generation to nature, including the forest. Therefore, the recreational function of the forests is central in such discussions.

This shift towards a more involved public is a general phenomenon in environmental policy making, but it has had dramatic effects on the forestry sector, as historically the management was rather monopolistic and hierarchical. The legitimacy of experts over forest management has been challenged with the changing demands from society. In other words, the involvement of various groups has become a new task, ranging from the private sectors, states, Non-Governmental Organizations (NGOs), indigenous people and public or local residents. This does not imply that criticisms to forestry sectors have emerged suddenly in the 1990s. For example, the category of "analysis and criticism of forestry public" relations has existed ever since the 1970s in Germany, Austria and Switzerland (Schmithüsen *et al.,* 1997). Nonetheless, the self-image on forestry institutions is more highly contested at the moment than ever before, due to the increased interactions with the public that is not afraid to challenge their legitimacies. Several publications explore these issues. Scherzinger (1996:15) refers to a study conducted in 1988, which demonstrated that forestry and hunting were more damaging to the environment than all other land uses, with the exception of agriculture. The Bavarian Ministry for Nutrition, Agriculture and Forestry has since published a report titled "Forest and Forestry in the Social Mind", attempting to explore the public's association with wood production and forestry. The former addressed the fundamentals of *aesthetics* in the published section, "Evaluating Criteria". The latter was more concerned with organizational questions, such as whether forestry sectors were taking public opinion at all into consideration. Within each of these works, different approaches were adopted and different attempts made to introduce or to study aspects of public relations with the forest, as well as the general topic of forestry aesthetics.

How are forestry institutions reacting to such challenges and how are they changing their role? Different frameworks have been developed to address such challenges. For example, Cloke and Jones (2000) referred to this phenomenon as "*recent configuration of governance, in many areas of public function, including environmental management"*. The International Labour Office (ILO) labeled it as "new governance

strategies" in their discussion paper, claiming that there had been *"clear transformation of society's interest in forests and a greater need for forestry to interact with the public"* (ILO *et al.,* 2000). One response to these needs was the formation of the *Forest Communicators Network*, which was officially approved and launched in October 2000 under the Food and Agriculture Organization of the United Nations (FAO) and United Nations Economic Commission for Europe (ECE), with the *"overall goal of creating a positive image of the forest sector"*. Therefore, it is evident that the importance of communicating with the public or serving their evolving interests is being gradually recognized. The International Union of Forest Research Organizations (IUFRO) initiated a task force that aimed to establish a network (via internet and e-mail) between all scientists and teams that were interested in Public Relations (PR). It is clear that policy makers and scientists are aware of the need to communicate with the public. Yet the author argues that the response of the forestry institutions is *ad-hoc,* in the sense that forestry institutions are rather passively responding to social demands and not searching in a systematic manner that would create or stimulate such demands. If the *"function of the marketing is to analyze the customer needs and transform them into business opportunity"* (Hansen and Juslin, 1998:3), then customer needs are presently not fully analyzed nor simulated. These marketing concepts ought not to be limited to forest products, but should apply to the public's whole experience in forests.

The purpose of this paper is not to discuss the challenges encircling the issue of public relations of forestry institutions in its entirety, or the resultant decision-making processes. It suffices here to summarize two main points. First, the legitimacy of the forest institutions are challenged, and interactions with the public are increasing as a consequence. The response from forestry experts so far has been largely based on an ad hoc basis, namely responses to the challenges for the forestry institutions is not systematic, even though words such as "stakeholder analysis", "corporate identity", "marketing", and "conflict management" have entered the forestry policy arena. There is a need to explore what the image of forests is in the public's mind in order to be pro-active and competent with the "marketing" of forests. Forest aesthetics also has great potential in serving the public. A largely overseen area is the out-of-field image of the forests to the public. The representations of the forest are as important as field experiences. Therefore, there is no need to be dogmatic on the in situ forest experiences. For example, in the field of tourism, the power of images is widely recognized. This paper is one of the first to expand such concepts to the public's perceptions of forests by the use of photo images.

1.3 Remarks on Photo Contests

1.3.1 Why bother?

Figure 1 shows a panel exhibited in the main conference building at the World Summit on Sustainable Development (WSSD) in Johannesburg 2002. One of the images that won the gold prize in the "UNEP-Canon International Photo Competition 2000" was used here. In the origin, one work consisted of three pictures showing floating kids at Manila Bay. In any case, this example illustrates the two functions of prize-winning photos in contests, namely symbolic appeal and use in everyday life. The first function of the symbolic appeal is strengthened by the fact that the pictures are selected from

those taken by members of the general public. The second function is that the prize-winning pictures are used in practical materials, such as in calendars, front pages of magazines, postcards (or relevant electronic E-cards) or exhibition panels, as in this case.

Figure 1: Prize-winning photos that were exhibited at the WSSD in Johannesburg. Photographed by Ryo Kohsaka.

It is not only the "top of the line" prize-winning pictures that make photo contests worth investigating as a social event, but it is also the whole process (announcement, evaluations and presentation) that is strikingly unique. The actions by various organizations for sponsoring, hosting and cooperating vary (in photo contests), compared to advertisements or museum exhibitions. The entire process of conducting photo contests is often intended for raising awareness activities or PR purposes. For example, the above quoted UNEP contest claimed: *"Environment awareness is the U.N.'s photo contest goal"* (South Coast Today newspaper). Therefore, the process itself is usually intended to influence society.

In addition, when we look at the organizers of these events, there is a wide range of characters involved. Various organizations hold photo contests, from NGOs, newspaper companies, international airline companies, beer manufacturers, municipalities, national governments to the United Nations organizations. The photo contests analyzed in this paper also involved the participation of numerous organizations. The photo contests used to provide source material for this study involved a variety of organizations, including cultural museums, a local bank, and forestry-related foundations.

In this study, we focus on two arguments that are aimed at contributing to the social theory of photography as cultural representations. When photography is discussed as a form of representation, the debate has conventionally been focused on social constructions of femininity, nationality, ethnic minority, or animal welfare. These views are understandable, since feminism has been one of the leading arenas in which the neutrality and objectiveness of photographs have been challenged. On the other hand, the political implications of photography of forests have been less dominant compared to those depicted in paintings or in cartography. The second argument is on the relationship between the author and the text. In social theory, the analysis of texts and their relationships with the author have been under severe scrutiny. Nevertheless, the analysis of the images has been either overseen or secondary to the analysis of text.

In analyzing visual images as text-made contributions, breaks away from narrow physical focus and interpretations. As evident in discussions of landscape, where the "landscape as text" metaphor has gained significance, the landscape is no longer viewed as a mere physical object, but also as a cultural media in which inhabitants were taking part in its construction. Having noted these advancements in social theory, it is still apparent that the interpretation of visual images is still widely contested when compared to discussions of texts-and-author in all disciplines within the social sciences.

When taking into account the number of end uses, the potential to influence public perception, the number of organizations and participants involved, and the overall contribution to social theory, the author argues that photo contests are significant social events. Nonetheless, the role of photo contests in the context of social sciences or in forestry sciences has not been addressed and research work in this field is virtually non-existent, leaving room for social inquiry.

1.3.2 Definition of a photo contest

The characteristics of photo contests can only be described after addressing the question of what defines a photo contest. A photo contest is an event where the public is invited to submit photos, after which a set of winning photos is selected. Members of a jury or panel usually select the winning photos, with the exception of voting contests that reply on the participation of the public or a select audience. The winning photos are usually published or exhibited in various forms and public media. A photo contest can also be described in its procedural phases. During the organizational phase, photo contests do not only relate the hosting organizations with the public, but also to various other organizations. Coalitions often occur, such as between governments and NGO groups, as well as between competing parties such as amongst private camera manufacturing companies. Photo contests may also serve as an advertisement opportunity for participating organizations. At a cultural and political level, the winning pictures from the photo contests are considered to be more legitimate than ordinary produced commercial pictures. It is important to recognize the fact that the source of these photos is usually from the general public and not restricted to the hosting institutions. This gives the winning photos more significance than commercially produced pictures by professionals. Secondly, photos are selected through the evaluations implemented by a jury, which endows a winning photo with a special sense of authority. Thirdly, the hosting institution guarantees its support to the winning photo from the sponsored contest. In summary, photo contests constitute social events that have clear procedural structures, but they simultaneously have complex cultural and political implications.

The common procedural structure of organizing a photo contest encompasses three different phases: (a) publicity,(b) selection, and (c) public exhibition. Historically, past photo contests have not been characterized by these three distinct phases. For example, the travel magazine *Merian* conducted photo contests in the 1970s but did not execute an exhibition phase, since the winning pictures were not published (only the names of the winners were announced in the following month's issue). However, the purpose of this paper is to analyze the *contemporary* shared images through photo contests, thus not focusing on the various forms of photo contests in a historical perspective. The same applies to the development of the new media, such as video players or digital

cameras, which are increasingly being used. The German government (Bundesamt für Naturschutz) organized "Spot for Nature", which was a competition of nature advertisements in video format. This event, now organized annually, is one of the first that involved the video format and with the results posted on the Internet. Although these digital images (and a few of their contests) are certainly expected to gain more salience, this paper concentrates on non-digital photo contests with ordinary photography equipment.

This paper also aims to analyze two additional components shared by three photo contests. The first feature is the evaluation by a jury consisting of plural members. Any contests that were selected based on personal choices or a direct voting system by participants or by the general public were excluded. The reason for this selection was to encompass the most common practice of photo contests. One-man jury systems were extremely rare. The direct voting system appeared to be more popular in North America or over the Internet, but it was not a conventional form in central Europe or in Japan. In addition, the intention of the jury in the selection process was also investigated. As seen above, photo contests are intended to reach a wide public audience, which is also the underlying interest of the hosting organizations. Therefore, the assumption in this paper is that the jury selects such images according to public appeal, thus resulting in commonly shared public icons appearing in photo contests results. The second feature is the fact that all three photo contests used in this study were open to any interested participants. In other words, there were no limits or qualifications imposed on contest entries. In all contests, the language was an indirect filter as instructions concerning applications were given in German. Nevertheless, entries were also submitted from North America and Japan, despite the fact that instructions were given in German. This open participation strategy that was announced was a crucial aspect of these photo contests, as it relates to the boundary of legitimacy, which was of central theoretical importance to this paper.

Therefore, in pursuing the definition of aesthetics categories by the public, the prize-winning pictures in photo contests are the main focus in this paper. Notably, it may seem puzzling that contests with a jury are the focus as opposed to those with direct voting systems. However, it is assumed in this study that the jury and their negotiation processes serve as filters, which enable us to identify and assess which contemporary icons are commonly shared by human society. There are also two additional reasons for this jury preference. From the results of advertisement analyses, the process of discussing and even brainstorming among groups of individuals are the established way of selecting the most publicly appealing image, rather than conducting public voting or questionnaires that are focused on individual preferences. Secondly, the symbolic authorizations by the hosting organizations of the contests through juries are regarded as an indispensable component, serving the social function of such photo contests, as described above.

1.4 Rough Sets Theory Meets Discourse Analysis

1.4.1 Advantages of the two approaches

This section will address some of the methodological issues of this study. A brief description and justification of the rough sets theory and discourse analysis are also given. These descriptions are followed by the historical descriptions of qualitative approaches in handling images or photography in social art disciplines. After looking into the history, a summary of the grounds and advantages of applying discourse analysis is presented.

Before initiating separate discussions on the two methodologies, the advantages of combining the two approaches are discussed here. In terms of methodology, this paper experimentally combined two very different approaches to analyze the same data set; the rough sets theory as a quantitative method, and discourse analysis as a qualitative method. Both approaches have been increasingly applied in environmental policy or related decision-making analyses. Before explaining the technicalities of the two approaches, some advantages of combining the different approaches are presented here. To the author's knowledge, this study is one of the first to methodologically bridge two different approaches from two different fields.

These two approaches were selected for specific reasons and purposes. Here are three initial arguments for the implementation of both approaches. Examples from the existing literature are discussed in the following section.

- Both rough sets theory and discourse analysis are frequently used to analyze the decision making process;
- Both approaches are appropriate for ambiguous and sometimes inconsistent information; and
- The final results of rough sets theory in *"If... and... and... then..."* format are easy to interpret. Alternatively, the results are required to be tested against the original data in terms of the ways people speak and express themselves. Therefore, the simplified form of rough sets rules are compared to the more complex descriptions to examine the general applicability in judgments of aesthetics.

1.4.2 Rough sets theory

As alluded to in the third point above, it is the characteristic of the rough sets theory that results are given in the relatively simple form of *"If... and... and... then..."*. The rough sets are described as *"one of the basic tools for knowledge discovery in a database"* (Pawlak, 1991) together with fuzzy sets, neural networks and cluster analysis. The method has been widely used in marketing, medical fields, cognitive science, and policy analysis. The rough sets theory analysis enables the handling of "vagueness" and "uncertainty", and has therefore, been a popular analysis tool ever since its introduction by Pawlak in the early 1980s. According to Greco *et al.* (2001), rough sets are increasingly acknowledged to be useful mathematical tools for the analysis of a vague description of objects. The term "vague", referring to the quality of information, means inconsistency or ambiguity, which follows from information granulation. The rough sets

philosophy is based on the assumption that with every object of the universe there is an associated certain amount of information (data, knowledge), expressed by means of some attributes used for object description. According to Obersteiner and Wilk (1999), the philosophy of the rough sets theory is founded on *"the assumption that some information is associated with every object of the considered universe (data, knowledge)"*. For example, in this paper, the universe consists of grouped pictures, criteria and descriptive keywords, and personal attributes (nationalities, gender, age, education). The pattern of grouped pictures characterized by the same attributes is assumed here to be indiscernible, this being the mathematical basis of the rough sets theory.

Greco *et al.* (2001) confirm the argument that the rough sets theory is based on the assumption that analyzed objects may be considered only in the perspective of available information about them, leading to the conclusion that knowledge has granular structure. To quote:

> *"The granularity of knowledge here means that some objects of interest cannot be discerned or appear as identical or similar. The indiscernibility relation constitutes a mathematical basis of the rough sets theory; it induces a partition of the universe into blocks of indiscernible objects, called elementary sets or granules that can be used to build knowledge about a real or abstract world. A set of objects (or class), which cannot be precisely described by elementary sets (is not a union of some elementary sets) is called rough (approximate) — otherwise it is referred as a crisp (precise) set (class). A rough set is described by two ordinary sets called the lower and the upper approximation; the lower approximation consists of all elementary sets which surely and totally belong to described set of object, while the upper approximations contains additionally elementary sets which partially belong to described set of objects. Obviously, the difference between the upper and the lower approximation constitutes the boundary region of the set, whose elements cannot be characterized with certainty as belonging or not to the described set of objects, using the available information"*.

The most relevant argument from Greco *et al.* is that the ultimate result is in the form of "*if... then...*" decision rules, using the most relevant attributes. Therefore, results are in a form that is easily interpreted.

1.4.3 History of social approaches to images: semiotics as an example

There are several different approaches to analyzing images. An overview will be given here, as well as an introduction to relevant discussions. However, the relevance, in a strict sense, are limited in terms of the fact that the pictures that are frequently grouped together in the interviews are the main focus, and not advertisements or art works which are the main focus in most other approaches. A unique characteristic of this paper is that it is based on empirical data from interviews, rather than being evaluated by researchers. Some approaches, such as culture theory, sociology and comics-magazine analysis, are helpful in comparing the photo contests with other media or events. Secondly, semiotics and iconography are the main tools of analysis, once the frequent sets of pictures are determined, treating them as icons or images with myth. An

example of the semiotic approach in practice is given below. At first glance, it seems impossible to directly apply the approaches elucidated below, since different approaches are relevant at two different stages of this research (with overlaps, of course, as sociology and semiotics are broad disciplines). The third stage involves linking the criteria and icons to collective memory in society. However, this discussion is not within the scope of this paper, which focuses instead on the different approaches used for evaluating image and photography interpretations. These are rather specific discussions in social sciences that need future study to become linked to discussions in forestry sciences and landscape preference studies. Due to the profound discussions in this field, the readers are advised to pursue literature in each field, some of which are listed in the references.

An example of the semiotic approach is given here to give an idea of a typical approach employed by another social discipline. The semiotic approach is chosen from the other social approaches, such as iconography, hermeneutics and visual anthropology, because of its central role in the discussion of representations (see Hall, 1997 for its historical development). An image from a cigarette advertisement using a forester is analyzed by this approach. This particular advertisement image has been intensely analyzed in the field and therefore, serves as an appropriate example. After the analysis, a discussion is presented to highlight the characteristics of the semiotic approach, followed by a comparison to the method of discourse analysis. A cigarette advertisement is appropriate for introducing the semiotic approach, since the promoting message is relatively straightforward. This requires the creation of a "myth" that cigarettes are good for people and the main focus of the semiotic approach has been decoding such myths, with emphasis on images or photography.

The image here was used in a series of advertisements for "West", a cigarette brand. In each series, one female (or group of them), dressed in different costumes, appears with a male figure, normally dressed, and both are smoking. Costumes of the female figure range from farmer, nurse or anthropoid (caveman). The image in focus is titled "Holzfällerin" (wood cutter/lumberjack) with a forest in the background (Figure 2). In cinemas, most of the advertisement portrays a story. It is usually composed of three phases. It begins with a descriptive phase in which the activity of the female figure is presented. Then a tension phase occurs when the female figures encounter a stranger in normal clothes. In the final phase, the tension is solved when the stranger begins to smoke and lights a cigarette for the female figure. The image is obviously showing one of the final phase, where the two are able to relate to each other by smoking a cigarette.

There are a couple of specific terms for semiotics. The described object, for example, is called a signifier and the concept or what it symbolizes is called the signified. The characteristic of the semiotic approach is that these relationships between the signifier and signified build up, creating a larger message or myth, as a result. The analysis starts with the description of the image. The first level consists of a signifier and a signified. Generally, as in our daily conversations, people are not consciously aware of the codes and cannot articulate them even though they respond to them. The relationship between the two is arbitrary and their meaning has to be learnt, similar to learning the grammar of a language (or a set of codes). Once the relationship has been learned, the signifier and signified turn into the "sign" or the meaning. Myth is essential in the next order of the semiological chain when a sign in the first system becomes a mere signifier in the

second. The result of the two, namely the second sign, is the myth itself. At the second order, the signifier, or form, "is both full and empty" (Pringle, 1988:143; see Figure 3). The order sign, which is the "meaning", nourishes the myth, yet when the first order sign of meaning becomes the form its contingency is left behind (Pringle, 1988:143).

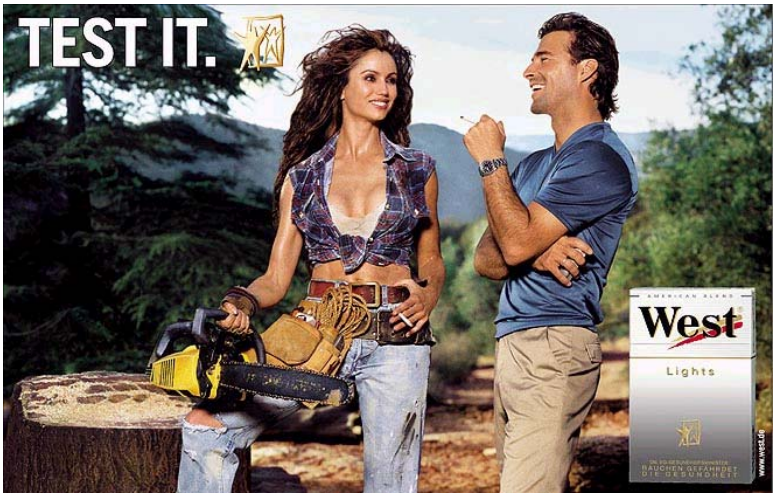

Figure 2: "Holzfällerin" (wood cutter/lumberjack) motif of an advertisement for the cigarette brand *West.* Reproduction permitted by Mr. Esther in the West Team.

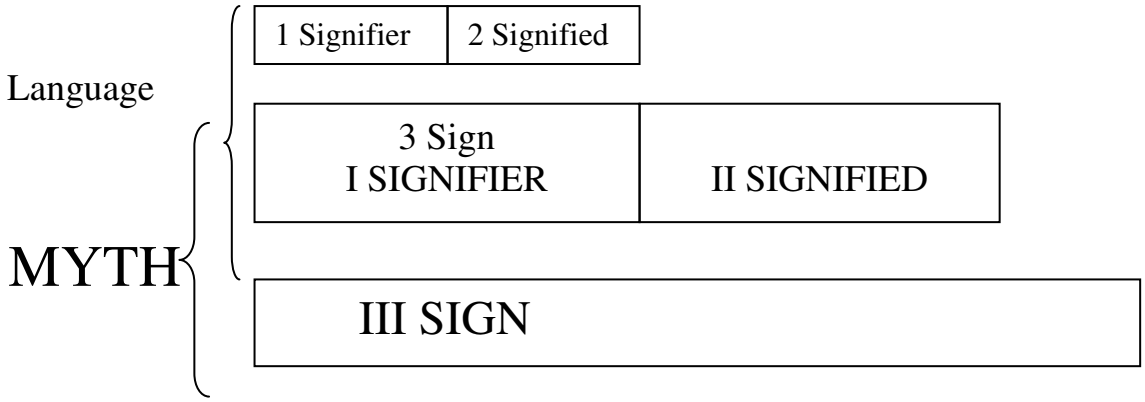

Figure 3: Semiological chain.

In our example, the first chain of signifier contains the main objects, such as the freshly cut stump, a young female wearing rugged clothes with a chainsaw in her hand, and the young man smiling with a cigarette in his hand. There are also other less obvious signifiers, such as dirt on the female's trousers and open mountainous landscape. In addition, text and photography are added to the main image. The text in the headline proclaims "TEST IT" in large font and is written in English on the left upper side, as well as a photographic cigarette box of "West" indicated on the right bottom of the image. These all link to the "signified" and in the first chain the young healthy active woman is smiling; probably because she has just cut a piece of wood. One young healthy man beside her is enjoying the interaction. The headline echoes the challenging

work that she has done. This first phase builds up to the next phase that women and men are enjoying life in the wilderness of nature. The female has just cut one big tree and the couple appears relaxed, active and sexually attractive. The cigarette is blended into this picture as a tool together with other small tools, such as the chainsaw, and dirt on the female figure. The second chain signified is that cigarettes are fit for relaxing after achievements and that it is also a natural part of life. There are two major things signified: One is obvious, that smoking is a normal thing to do when relaxing in nature and 'talks' with sexually attractive people. The other young and challenging women/men are not afraid of challenges, such as testing new brands of cigarettes. The second layer leads to the third stage of the sign that "West is fit for healthy, young people who are not afraid of challenges and are willing to enjoy life".

The largest achievement of the semiotic approach was its establishment of one of the first methods to approach visual materials. It accomplished this by transforming the content to the layer of texts and messages. It is especially important that the semiotic approach pointing out the meaning of images (such as in advertisements) do not rely on a rigorous structure, but rather on a structure that is rather inconsistent where the signifier-signified layer jump to the next one (what Pringle (1988) refers to as a "full and empty" structure). On the other hand, the semiotics approach tends to confine itself in each singular image and disregards the contexts of from where the image originates or how the signifier could be linked to the signified at all. In the example showed here, for example, there is an underpinning context that "West" is a European brand that lags behind Marlboro in its market share. There has been an increasing critique that the semiotic approach tends to confine itself in each image. The purpose of this paper is to identify the signified and myths for the public. More basic data are required and therefore, the words from the interviewees were recorded in a less limited manner. Often, the meaning level was not reached, but the descriptive words remained. For these reasons, discourse analysis was applied rather than applying the semiotic approach to each image.

1.4.4 Discourse analysis

In this section, a description of discourse analysis is given, followed by the justifications as to why discourse analysis was an appropriate approach for exploring forest aesthetics. The descriptions are based on two sources, Hajer (1995) and Dryzek (1997). The former comparatively analyzed the acid rain policies of Britain and the Netherlands. The latter focused on classifying the main environmental discourses, according to different questions such as sustainability, economic growth and solutions for environmental problems, but did not focus on a specific problem. It is not the aim here to comprehensively explain the methods. Two works by Dryzek and Hajer, which have different views on discourse analysis approaches, are introduced to highlight the diversity and characteristics of the approach.

Why is discourse important in understanding environmental problems? Dryzek emphasizes the complex and interconnected nature of different environmental issues, such as in the case of tropical rain forests, where the two issues of carbon sink and ecosystem are both relevant. He argues that these high degrees of complexities lead to a corresponding high number of *"plausible perspectives"*, and discourse is important

because it *"conditions the way we define, interpret, and address environmental affairs"* (Dryzek 1997:8–10). This alternatively defines what discourse is. It is understood as a shared way of comprehending the world and hegemonic discourses put various discourses together into coherent stories (Dryzek 1997:8). Hajer turns the perspective around and argues that environmental politics are all about the process of defining the problems themselves. There is no straightforward development of the issue from problem to solution, but the *"policy making is in fact to be analyzed as the creation of problems"* (Hajer 1995:8). Both of them argue that the interpretations and the way people make sense out of the issues are crucial in analyzing the environmental issues.

Most of the works in discourse analysis, including the two authors mentioned here, focus mainly on texts. The unique characteristic of this research is that images and pictures are the main focus of the discourse analysis approach. The interpretations are even more crucial (and less studied) when it comes to images as they are used in environmental politics. Studies on environmental activism were one of the first to link the visual images to environmental politics. This research is aimed to add a component of these studies to discourse analysis. Deluca (1999) and Wapner (1994) both emphasize the importance of spectacle images by the NGOs in appealing to public sympathies. The image of environmental activists climbing up ships is an example in many contexts, such as in protest against illegal timber trading, oil trading, etc. A similar image of a Greenpeace activist climbing up a Russian tanker was recently used in a Mainichi newspaper in Japan as a protest against Siberian forest destruction (Kohsaka, 2002). It is unfortunate that discourse analyses are focusing exclusively on texts of governments, media and NGOs. Given the increasing role of NGOs in environmental issues, there is a potential in exploring how people understand and talk about pictures and images from an environmental perspective. It is not to say that the political clout of the NGOs is constantly increasing. Rather, the role of NGOs in evoking the attentions and framing the issues are increasingly recognized. Humphreys (1996) pointed out that the NGOs did not have much influence in the later stage of forestry negotiations in the Rio Summit as *"no agreement on a formal mechanism by which NGO views can be fed into intergovernmental negotiations other than the traditional methods of lobbying and pressure group activity"* (Humphreys, 1996:169). The same situation was repeated in the Johannesburg Summit, partly due to the geographically separated forum for NGO's and governmental negotiators. What is more interesting is that Humphreys admits difficulties and limits in conventional academic disciplines in dealing with the emerging role of NGOs. Regime theory, which he has used, has traditionally been focused on national actors and he calls for a need to develop approaches to address the dynamics of NGOs.

The scope of this paper is not seemingly linked to such discussions. Yet the outcome of a better understanding of visual images of forests will be a contribution in the long run. Understanding how the public react to forestry images is useful for NGOs for their effective campaigns. As mentioned in the introduction, the importance of the PR is recognized amongst forest experts. It goes without saying that images are also important in PR or in the communication of forestry institutions. Discourse analysis in this paper is including non-verbal construction of forests in social memory, in addition to verbal communications. This may seem radical considering the origin of the term "discourse", which means how people talk in verbal communications. Yet the verbal and non-verbal

communication types are not in dichotomy, but rather it is assumed that there is an overlapping relationship. The aim of this paper is to provide the basic material for discussing image-concept relationships, as well as nonverbal-verbal relationships.

Therefore, there is a potential to explore photo contests for social science (including discourse analysis) because photographic images have not been fully explored despite their major roles in NGO activities. For the social sciences, knowledge of the functions and diversity of photo contests will be an immediate gain. This paper further contributes to the discussions of the Foucauldian archive of collective memory of landscapes at a more theoretical level. In analyzing the result of the contests from a wider socio-cultural context, the social construction of a nation as "folks of forests" is re-examined. It is widely believed that the German speaking community as "folks of forests" is a very unique phenomenon, but the process could be very similar in different contexts. Photo contests are one way to approach the very process of such social constructions of nature as national or regional symbols. In general, attention to these issues has been minimal when compared to the interpretations of the texts.

2 Review of Existing Works in Forestry Science

2.1 Introduction

In the first half of this section, trends and a short history of the studies of public (wooded or forested) landscape preferences in forestry science are described. These descriptions are derived from literature reviews, as well as other reviews for this discipline area. This section also aims to challenge the mainstream paradigm in two points, which are discussed in the latter part of this section.

First, the author's aim is to give an overview of existing works using pictures of public preference for forested landscapes. In the field of forestry science, traditional questionnaires consisting of multi-options, cards and pictures are utilized in order to analyze public preferences. A typical example would be questionnaires showing picture A with a clear cut and picture B with a patch cut and asking the interviewees' preferences. The degree of preferences are often quantified and compared at a later stage. Finally, discussion points for reflection are raised, by clarifying the "jumping logic" of such studies. By "jumping logic" the author contends that in these studies, a certain forestry practice, e.g., patch cut, is preferred over clear cut *because* the picture with the former is more frequently preferred by the public than the other. One pitfall for such questionnaires lies in the process of pre-screening words, pictures and eventually values or framing. It is especially problematic when the interviews are conducted ex situ or outside the forests. Before we come to this conclusion, there is a great potential in studying what people see in the representation of the forestry landscape.

Secondly, there have been arguments in the field of preference questionnaires that "computer generated images are better than pictures" in that they are less variable and of consistent quality. Nevertheless, there are also advantages to using photography depending on the focus of the research. Most often the key issue is not the type of media or print that is used, but it is the material that is being presented in the first place that has the greatest importance.

The two aforementioned norms are to be kept in mind when reviewing descriptions of conventional forestry science. Later in this section, the norms are highlighted in order to emphasize the need to explore the general public's perception of forest aesthetics more freely.

After the discussions on these two points, the significance of reviewing images from photo contests is evaluated. In forestry science (as well as in social science), these photos from photo contests *as materials* will constitute a new area of analysis. Furthermore, the content of interviews is novel, since the sources and frames are not pre-determined by the researchers, but rather from outside the academic source. In addition, there has not been much focus on the aesthetic experience and categories generated by the public and how these compare to scientifically-based categorization schemes.

2.2 Existing Works in Forestry Sciences

2.2.1 Research using multiple choice words and interviews in the forests

This section starts by introducing studies that are indirectly connected to the scope of this paper, namely the rating and ranking of words. There are studies asking people to categorize the words, or less structured work that ask people to write down the terms that are associated with forests. There is widely quoted work in Germany in which people were asked what they prefer in words relating to forests (Asseburg, 1985; Scherzinger, 1996:33; Jedicke, 1994:14). Asseburg ranked words from his interviews with visitors in forests. Words such as Wäldchen (small forests), Einzelsträucher (individual bushes), Gliederung (structure) and Gefälltes Holz im Wald (cut wood in forest) are listed and rated, including whether words have positive or negative connotations. The similarity and differences of these studies on verbal communication are of high interest but the comparison or review of these genres is abandoned because the study of images is at a very initial stage. The development of the two fields is too asymmetric. Exceptionally, the work of Tahvanainen *et al.* (2001), included as "visual versus verbal information", is discussed and the visual issues are also in focus.

The other approach that this paper did not take into account was questionnaires conducted in the forests. As the aim of this paper is to contribute to the forestry institution and their PR, there are needs to use ex situ materials or representation of the forests. The aim is to explore and include the opinions of the people who are not regularly visiting forests as well. Therefore, works that have asked the public *in situ* for forestry practice are excluded from this review.

2.1.2 Review by the IUFRO occasional paper

The IUFRO occasional paper "Perceptions and Attitudes Towards Forests and their Social Benefits" by Schmithüsen *et al.* (1997) is one of the most comprehensive works in reviewing the existing social enquiry related to forestry in German speaking countries. The review covered major forestry journals such as "Forstarchiv", "Forst- und Holz", "Forstwissenschaftliches Centralblatt", "Allgemeine Forstzeitschrift" and "Allgemeine Forst- und Jagdzeitung" from Germany; "Centralblatt für das gesamte

Forstwesen" and "Österreichische Forstzeitung" from Austria; and "Schweizerische Zeitschrift für Forstwesen" from Switzerland. The period of focus is from 1960 to 1995. Unfortunately, the categories for reviews in this paper are too rough to be directly adopted here. There are several relevant categories that are overlapping with the background of this paper or, even to reviews in this paper. For example, existing works under the category of "PR Strategies of Forest Services" and "Analysis and Criticism of Forestry PRs" are relevant to the background of this paper. Furthermore, works grouped under "Analysis of the Publics' Attitudes and Aspirations Regarding Recreational Forests" are, in a wide sense, related to the studies of interest here. Yet, all these categories are too general, as the focus of this paper is specifically on forest aesthetics. Although the work by Schmithüsen *et al.* cannot be directly imported here, it retrospectively proves that in all of the above-mentioned journals, no research exists that specifically focuses on public attitudes of forest aesthetics from 1960 to 1995 (assuming that the work is accurate and comprehensive).

2.3 Discussions in the Journal "Landscape and Urban Planning"

2.3.1 Why "Landscape and Urban Planning"?

For economical research reasons, it is not possible to repeat such an extensive review here. From the experiences of keywords hit and richness of discussion, the reviews here are limited to a few journals and a limited period of time. On the other hand, a readily available computer search using the keywords "aesthetics" includes articles in journals such as "Tasforests" or "Forest Ecology and Management" that have more focus on silviculture and biodiversity. "Aesthetics" are more rhetorically used than as a main focus.

One journal that has actively been involved in genre "forest aesthetics" is "Landscape and Urban Planning". There may be a discussion whether this journal is relevant to forestry science, but it is a fact that forest scientists, especially those from Scandinavian countries have been presenting papers here. The second supporting argument for the journal is that studies incorporating photos and computer generated images are present in this journal. Therefore, focusing on the journal enables us to critically evaluate the two approaches in comparison. In addition, the "urban" visitor component is an important factor when considering the PR target group of forestry institutions because urban residents are likely to be a main focus. Having said this, other works of authentic sources (governmental bodies, major NGOs) are also occasionally referred to, when considered appropriate and contributing to the discussions.

The works in the journal are separated into three groups in this paper. The first group includes a review of works that reflect and give overviews on the history and development of the discussions on forested landscape research, similar to the work of IUFRO mentioned above. The second group consists of works on landscape preferences using photographs. The third group is the works that use computer generated images for preferences questions, a strategy that is emerging to be main stream in the field. After reviewing these works, the two norms that are underpinning these works are examined.

2.3.2 Reviewing works in "Landscape and Urban Planning"

The studies reviewed here are concentrated in volume 54 of the journal "Landscape and Urban Planning", which is a special issue that contains works presented at a conference titled "Our Visual Landscape". These works reflect on the last 20 years of development in landscape preference issues. The reflection by Bell (2001) is of special interest as he has focused his discussions on the forest. Daniel (2001) also focused on two discussion points relevant to the inquiry of this paper. This section critically introduces their arguments. Some other authors are discussed later in the section.

Bell (2001) shares a common background with this paper as he recognizes the need to incorporate visual landscape management into sustainable forest management (SFM). He also refers to the development of criteria and indicators in the Montreal and Helsinki Process that include *"requirement to involve the public more directly in decision makings about forest planning"* (Bell, 2001:203). Nonetheless, the resulting conclusions are different in the following points of Bell's arguments:

(1) Practitioners in forestry institutions are the main users of the tools developed for visual management. Thus, research should be aimed to provide practitioners with *"more and better tools, particularly for evaluating the potential effects of plans and designs and for communicating and participating with local communities"* (Bell, 2001:208).

(2) There is no problem of applying the established methods of assessing scenery with photographs. They need more wide ranging case studies with different forest ecosystem types to be sufficiently comprehensive enough.

As the contended nature of the photographs will be discussed in the following sections with examples, only the disagreement on the first point is discussed here. The linking of academic works with praxis in forestry institutions is currently an issue of high priority, as forestry science has always been an applied science with practical purposes. It is also of importance to the German speaking forestry academies, as the biannual meeting in 2000 was titled "Forestry Science as a Model for Multidisciplinarity", and there are articles that focus on the topic as "transdisciplinarity" (Flitner and Oesten, 2002). However, aiming at the practitioners as beneficiaries causes difficulty when the focus becomes too narrowly positivistic (in simplistically assuming that social life and its knowledge is readily available/observable for policy use), or bias is introduced since the framing of "useful information" will be predetermined by researchers. In addition, considering landscape preferences and analysis just as a tool has highly problematic stances. The communication flow that Bell has in mind is still, in the conventional way, that forestry practitioners or institutions disclose their information to the public.

The material that this paper provides is not of direct use to practitioners in the short term. In addition, the flow of input is from public to forest institutions. However, in the longer term, the author argues that these inputs will contribute to the discussion as to "who should the enquiry serve" by reminding researchers that the public needs to be a central focus as well. Input in this paper from the public with a high degree of freedom and with less restriction from experts and scientific norms will be one of the first studies to start discussions on these research topics and in conducting unique group discussions as part of its method. Serving both practitioners as well as the public would be ideal but

the inquiry of public preferences is not automatically equal to serving them. Just as Bell (2001) mentions explicitly to serve practitioners, which means the underpinning norm is to serve the forestry side, it could turn out to be ineffective in accommodating public views and opinions.

Daniel (2001) reviewed overall landscape quality assessment approaches and provides us with several discussion points. His metaphor that expert and perception-based approaches are evolving towards a "shaky marriage", where both approaches are applied in parallel and then merge, is the first point that needs consideration. The second point is on his separation between *assessment* and *valuation* of aesthetic quality. The former is explained as the relative aesthetic excellence of one landscape area compared to others, while the latter is defined as valuations of aesthetic qualities — the worth of given levels of aesthetic quality relative to other values. The two are linked because *"means of defining and assessing any environmental characteristic typically reflects the ultimate use/value expected to derive"* (Daniel, 2001:271).

Returning to Daniel's first point that two approaches are merging was one of the points being raised during the presentations at IIASA. Questions were raised on how the results of this paper could contribute to the expert approaches in forestry planning and designs. As mentioned earlier, the concern raised in this paper (and attempted to propagate) is that there are pitfalls when superficially combining two approaches without questioning the underpinning assumptions. The major question here is not the precision of the evaluation, as is Daniel's concern. Naturally, Daniel's argument that public "perception-based assessments have met the generally accepted standards for precision and reliability" (Daniel, 2001:273) is an encouraging message, but the author sees problems in both approaches and in their underlying assumptions. Comparing two approaches are rather derailing from the main question in this paper. The danger of working with pre-determined framing and taxonomy applies to both expert-led as well as to the perception-led approaches. Therefore, the author argues with progressive narrative that the two approaches are emerging and evolving is problematic.

The distinction between assessment and valuations is not determined. Suggestions at IIASA by forestry experts to provide the interviewees with more purposes and contexts fall into the questions of this category. The suggestion was made that the "interviewees should be asked to group the pictures according to recreational, productive or artistic purpose". It is indeed difficult determine whether people are grouping the pictures according to assessment criteria or valuation criteria. Some people "assessed" the skills of foresters when looking at the cut stump and said: "This is not good. They have cut the trunk at higher place. It should be lower". Some compared the values with other activities, such as comparing agricultural/forestry activities to untouched nature. Details will be discussed in the results chapter but instrumental values versus extrinsic values were apparently existent in the interviews. The question of exploring the exact difference of how people react if they are given contexts and purposes or asked to assess/evaluate the pictures will be discussed in the section "New Tasks". It is the aim of this paper to "explore", which includes both criteria from "assessing" and "valuing". The valuation of landscapes is worth keeping in focus as there is a movement in forestry economics that is bridging the conventional economics with ethics or other social theory using the "value" as a keyword (for example, see Foster,1997). This paper, however, intentionally excludes these distinctions because the separation is instrumental for the

managing side, namely the forestry institutions. Before comparing or distinguishing the two views, we need to know roughly what the reaction of the people is toward forest pictures before the verbal communication even begins. The question being raised is not "values or assessment" but whether the public are going to express anything related to the two views when they are faced with photographs of forest aesthetics. The secondary interest of this paper is to explore how often people express criteria concerning assessment compared to valuation.

The term of "goal-oriented landscape analysis" by Terkenli (2001) is related to the "transdiscipline" discussion in forestry science. It is unfortunate that her example of a multidiscipline approach is not clear. A number of different approaches, such as Behavioral Ethnographic, Semiotic, and Neo-Marxist are listed but the concrete example of her analysis is ending loosely, pointing out the link of landscape to symbols of place and identity-politics. This paper suggests combining not only different methods from social science but the knowledge mining method of rough sets theory and social science.

2.3.3 Research using photography in "Landscape and Urban Planning"

In this section we present the most relevant reviews with a focus on concrete studies that are using photos, including slides. Three recent works, Karjalainen and Komulainen (1998), Silvennoinen *et al.* (2001) and Tahvanainen *et al.* (2001) are concerned with the forested landscape. An article and a report from other sources than "Landscape and Urban Planning" are introduced for comparison. These are Daniel and Meitner (2001) from the Journal of Environmental Psychology, Brunson and Reiter (1996) from the Journal of Environmental Management, and Lee (2001) from the Forestry Commission. Reflecting the intensity of the research in Scandinavia, three works are focusing on the Finnish landscape.

All of the works utilize the pre-categorized groupings of forestry practices, a strategy which is questioned in this report. Karjalainen and Komulainen (1998) used photography but with additional simulations of afforestation generated by computer. They have options as to where to afforest, the shape of afforestation, and choices of tree species. Silvennoinen *et al.* (2001) categorized the interviewees, according to the criteria of gender and ownership of forests. The attributes of the forests are height, age, species, and volume which are all forestry science categories. Tahvanainen *et al.* (2001) compared two slides, one with manipulated images of forestry practices. The forestry practices were small clear cutting, removal of logging residue, thinning, removal of undergrowth, and traditional management that dates back to the 19th century. Brunson and Reiter (1996) used pictures from old growth, clear cut, thinning, and two-stories. The questionnaire by Lee (2001) were multi-dimensional in that pictures were to be questioned according to activity types such as getaway, sport/recreation, timber, and picnic.

The most high degree of freedom is given in the work by Lee (2001), leaving room for the interviewees to decide. Yet, the aim of this paper goes even further than the approach used by Lee by requesting totally free expression of criteria and keywords evoked by looking at the pictures. By examining the ratio of how often the criteria are

derived from forestry practices or activities, the taxonomy of the existing works is challenged. However, if the interviewees react with similar categories and a criterion as in the existing works, this paper will reinforce the basis of the existing works. In either case, what is actually associated with the photographic representation of forestry aesthetics deserves to be examined. Are any of the forestry practices or activities existent in the discourses of the public? The aim of the existing papers is rather to evaluate the reaction to the changes caused by forestry practices, while the aim of this paper is to examine the existing systems of forestry aesthetics. The findings from the existing systems, however, will surely contribute to the preferences of forestry practices as it is likely to be the underlying values for preferring or detesting certain changes (at least partly from an aesthetic point of view).

2.3.4 Research using computer generated images

As mentioned previously, there is optimism within the field of forestry science that the two approaches of expert-led analysis and perception-base research are merging. The so-called computer generated images with ranging systems (scenery management system, computer-aided design, or even geographic information systems) are said to play a central role in combining two approaches (Daniel, 2001; Bell, 2001). In contrast to the optimism encircling computer generated images, the use of photographs are criticized. One example is given below from Karjalainen and Tyrväinen (2002:18):

> *"Use of photographs has been criticized, because photos, as well as other forms of visualization, are not able to represent the whole richness of real nature. They are not only less complex and less multidimensional, but they also offer less interaction than real scenes. Furthermore, despite careful attempts to control, there are often noticeable differences between photographs in such variables that are not in the interest of research (light, colors, shade and so on). This makes it difficult to draw right conclusions from the comparisons of the photos".*

As the critique covers most of the points in the field, it is counter-argued here whether it is still worthwhile to conduct interviews with photographs. The criticism differs from that of Lange in his article "limit of realism". The question whether the photograph is real or not is actually not a major concern, as the focus is on the representation of forestry aesthetics. The prize-winning photos are analyzed to approach socially shared schemes and motifs. The compositions, including color, light and shade, are of interest to this research. The above-quoted critique from forestry scientists show the conventionally skewed focus of the discipline, that aesthetics are not a central focus. It is unfortunate that the richness of photography is undermined. It is pointed out by psychologists, in the context of computer generated images, that certain levels of abstract *"representations appear to be inappropriate for determining landscape aesthetic/scenic beauty values"* (Daniel and Meitner, 2001:69).

In addition, photography has the characteristic to appeal to the memory of the interviewees, and enables group discussions. The photographs enable the pictures to be laid down on a table and compared. All these qualities are indispensable to the goal of this paper. The possibility of group discussions is important for the future tasks previously mentioned.

3 Methodologies

As we have seen, there have been a couple of established ways of using photos when quantifying forest preferences in forestry sciences. A new approach, however, is suggested in this paper. It is an attempt to leave more freedom to the interviewees, without framing the questions with forestry science perspectives. Rough sets theory and discourse analysis are utilized in a way that is designed to experimentally complement one another. Both approaches have gained their significance by being able to handle issues of contradicting and non-linear behavior in decision making, and in analyzing the process of environmental policy making. This paper bridges the disciplinary discussions between forestry and other social sciences, as well as the methodological combinations.

3.1 Profile of Interviewees

In this section a brief description of the 51 interviewees is given. Interviews were conducted at IIASA, a scientific institute in Austria, where the author was a YSSP participant during the summer of 2002. The group involved in the interviews included not only members of the academic staff and fellow YSSPers but also members of the non-scientific staff.

Members of the non-scientific staff were mostly local Austrians, who worked in the facilities and gardens. In the interviews, the variety of the backgrounds was recorded by asking whether people held academic degrees or not, and if they had one, it was further asked in what major. Environmental scientists and foresters were treated separately from the rest in some statistical tests later on. Thirty-seven people held academic degrees, while 14 did not. Out of these 37, 12 interviewees had backgrounds in environmental sciences.

The gender of interviewees was roughly equally divided, 23 female and 27 male. The largest national group was Austrian (19), followed by other European (20 in total), including the United Kingdom, Finland and Central-eastern European countries. The third group includes North America (6) and Japan (6). The age range was skewed towards the younger range of 20–29. This was mainly due to more willingness by the YSSPers to participate, compared to the staff. Table 1 provides the age distribution of the interviewees.

Table 1: Distribution of age and gender of interviewees.

Age Group	Male	Female	Total
20–29	11	8	19
30–39	9	8	17
40–	7	7	14

When this profile was presented at a forestry economics conference in Göttingen, Germany in 2002 criticisms from the floor concentrated on the fact that the interviews data originated from an environment related organization, resulting in a certain bias of the data. Although these criticisms are to a certain extent understandable, there are four

counter-arguments. First, interviews in this paper were relatively long, compared to conventional questionnaires. As the purpose was to allow the people being asked more freedom, the process was more complex. These requirements in time and labor were only likely to be gained within the organization that the author belonged, especially within a limited duration of research time. In addition, handling 36 pictures in 10x15(cm) size requires sufficient space, ideally a desk. Therefore, the second reasoning is that conducting interviews within an office was required, and our access to an office building was mostly limited to IIASA. Thirdly, the author did take into account these issues on bias by interviewing members of non-academic staff. The fourth argument is that this was the first study of this sort, where lots of trials and errors are expected. The purpose was not to have the proper representations of the Austrian population but to see to what extent the research framework achieves its purposes.

In the future, when interviews are conducted in Germany and Switzerland, more rigorous samplings are planned. The purpose at this initial stage was to see whether different criteria and rules exist for the forest aesthetics, and therefore the representation of the interviewees to the general population is of secondary importance.

3.2 Flow of the Interview

As the main grouping required space, the interviews took place usually on a desk with lots of free space. The majority of the participants for the interview kindly agreed to cooperate on the spot, but some were asked by making appointments beforehand. The interview consists of three parts, besides the profile questions at the very beginning. The pictures were laid down on the table section by section, so first six pictures for dead wood and then 36 pictures as the major grouping.

3.2.1 Dead wood preference

The first phase starts with six pictures containing the theme of "dead wood", followed by the main grouping exercise and familiarity of the pictures questions. No instructions or backgrounds were given during the interviews. At this "ice-breaking phase" with dead wood pictures, people were asked to comment on these dead wood images. The researchers asked explicitly whether they liked them or not. Interviewees express their preferences on each picture or as a whole. Besides, these "yes" or "no" questions, freely expressed words such as causes of death, associations, or evoked personal memories were recorded.

The reason that dead wood was chosen as a concrete theme requires clarification. Dead wood had the advantage over other issues because it was a relatively new phenomenon and had relatively homogenous support from forestry institutions. In recent years, this was not only witnessed by the increasing amount of literature but also in signs in the forests on the theme dead wood (see Figure 4). Current German forestry policy promoting the "Dead Wood Concept (Totholzkonzept)" is an obvious positive image with some exceptions in forest ecologists, who are pointing out the risk of insect damage risks. As it is relatively new (beginning in the late 1990s), this concept provides us with the opportunity to examine how the idea is penetrating the public mind.

Figure 4: "Dead wood" billboard and a sign in the South Black Forest. Photographed by Ryo Kohsaka and friends.

The second advantage of the theme is that the amount of the picture was abundant enough to build its own interviewing section. Judging whether the pictures include the theme is a sensitive matter, as it involves judgments on the content. Details on how the pictures were chosen in general will be given in section 3.3 but here is a brief description and arguments on picture selection on the dead wood theme. The danger of distorting the population is prevented by choosing only six pictures from the rest of the pictures that were not used in the main questions. Therefore, several pictures that had the dead wood theme were also included in the main 36 pictures. Five out of six pictures were selected from the "Pefi" contests and one picture was exceptionally chosen from another contest, "Natur Natur sein lassen" (Let nature be nature). The latter was a photo contest aimed at awareness raising and to illustrate the beauty of the national park by limiting the photos to those taken in the German national park. In this contest, the dead wood motif was especially emphasized in the "Let nature be nature" with the first prize being awarded to a dead wood picture in a Bavarian national park. The contest was co-organized by the geographical magazine GEO, NABU and the Bundesamt für Naturschutz (German Federal Agency for Nature Conservation). The prize winning photos were announced and printed in GEO, issue 11 in 1999. The contest could not be included in the main exploration as the theme was "nature" and not limited to "forests/trees". In summary, the six pictures were chosen either from discarded photos from the main grouping, or from the third source, so they did not affect or distort the population of the main grouping pictures.

The phase used exceptionally pre-categorized pictures, against the overall aim of the research to explore the category itself. The reason was to have a buffer stage and to ease the concern of the interviewees before plunging into category-free grouping. Starting with a concrete topic was considered helpful from the experience of experimental pre-test, when the interviews started with main grouping questions. Some interviewees felt puzzled and this initial phase was aimed to enable smoother transition to the main grouping, starting with a small number of pictures with a concrete theme.

A justifiable concern of this phase is the bias that interviewees get before the main grouping phase. A reasonable assumption is that "dead wood" becomes a strong grouping category, as a couple of dead wood pictures (cut wood, stump, etc.) also exist in the next phase. The justification for conducting this pre-categorized "yes or no"

question is twofold. The first reason is mentioned earlier, that there was a need to start with concrete material. The second idea was to test how far the "dead wood concepts" in forestry science penetrate into people's minds. The topic was appropriate not only because it was a relatively new concept, but also because the dead wood concept is regarded generally positive in forestry science (with a few ecologists resisting the danger with insects). The topic is a good starting point to test the perception gap between foresters and non-foresters.

The alternative way is to conduct a comparative grouping exercise without these sections. It can be tested whether the interviewees group the pictures similarly or not, to see the influence of the first section to the next main grouping. The results from interviews without this dead wood section (going directly into the grouping exercise) or interviews with all pictures mixed are discussed in the results.

3.2.2 Main grouping exercises

After the dead wood section, the interviewees are asked to categorize 36 pictures into groups. The number of groups was left to the interviewees to decide. The pictures were handed to the interviewees as a mixed stack. It was recommended to go through all the pictures at the beginning but it was left for the interviewees to decide whether to do so or start directly categorizing the pictures. Conversations took place as long as it was not on purposes, sources of pictures and any other indications on how other people had been grouping. The duration time for the grouping was noted up to the first 10 groups (in seconds) but they did not differ too much. Besides, the timing by the researchers caused uneasiness in the interviews and therefore the strict timing was abandoned. However, timekeeping (roughly in minutes) was recorded although not used for the analysis.

There were a couple of conditions to be taken into account in the grouping. First, no picture was allowed to stand alone, as the purpose was to see and identify the grouping rules and categories. Secondly, it was overtly indicated that "contest of picture" was more in focus than the physical feature of the pictures, such as size, color (meaning black and white vs. color), and printing quality. Colors of the contents, such as leaves and sky, on the other hand, were naturally allowed to be a category. It was left to each interviewee to decide how they started and grouped. Furthermore, the interviewees were asked not to look at the reverse of the pictures as an identification number was printed (in any case, it would have made little sense if they did see these numbers).

The character of this section is that verbal communication does not play a major role. Verbal communications are needed only to explain the procedure, to ground the pictures with two conditions. Therefore, the results of grouping the pictures are relatively independent of the language capability of researchers, or the interviewees. The main purpose of the grouping is to identify the frequent sets of images that are grouped together. In addition to identifying the frequent sets of images, analyzing the dynamics of the movement of other images, surrounding these stable sets of images are planned.

Once these sets are confirmed, there are a couple of hypothesis of how the photos will be grouped. Several example hypotheses are listed that occurred during the discussions with other researchers.

- The grouping will be strongly dependent on the source or the photo contests. Each photo contest needs differentiation from each other and there will be trends, colors and particular characteristics.
- The resulting groups will be dependent on the attribute of photography and photographers (same author, taken in the same season, black and white) because the technique and taste of the producers are determinant points when people interpret the images.
- The grouped pictures will be dependent on the attribute from the interviewees. The age range, gender and education will be a crucial factor in building a group. The factor of forestry science is of special interest.

In other words, the groupings are to be analyzed from the attributes of the screeners (jury of photo contests), producers, or viewers (public). Of course, the comparison of photo contests in a different era or countries is also important. The aim of this paper is to start the discussions, including such comparisons, and it was therefore limited to European contests from 1999 to 2001.

In the following phase, three keywords, criteria and reasons for grouping pictures were collected. Unless the interviewees asked during the groupings, the instructions were given after the groupings were finished. It was asked after the grouping, so that the interviewees did not have to think of keywords and criteria while they were grouping. The aim of grouping was to first identify the picture groups that exist in the social memory that are not necessarily clear in words or languages. Hence, verbal communication took place once the groupings were finished.

From the methodological reason that rough sets theory was to be applied, it was emphasized that *three* words need to be given for each group. At this stage of using verbal communications, the interviews were conducted mainly in English, except for the non-academic staff members from Austria or when the interviewer could do it in his mother tongue. The translated words into English were confirmed when notes were taken. The order on which group to start with was again left to the interviewees to decide. In the event that the interviewees wanted to change the cards while they were explaining, it was allowed that they change the cards into different groups.

These verbal data, together with the attributes of the interviewees were later put into the data in order to see the rules and tendencies. As three groups of data interact with each other in a complex manner, a conceptual map is shown in Figure 5. The "Grouping Data" in the figure is the largest data and the main focus in this paper. Verbal Data and Profile Data are experimentally applied to produce rough sets rules.

The results of the interviews are recorded in tables (Table 2), which shows the link between verbal data and grouping data. Profile data are recorded on a separate sheet for the sake of privacy protection. On the top left, the subject number is given and then the number of the pictures that are grouped together in the middle and verbal data on the right. Subject numbers are the identification for each interviewee. The image number is the identification number of the picture, and pictures that are in the same group are listed in certain groups in a row. Verbal data are the three words that were given after the groupings were finished.

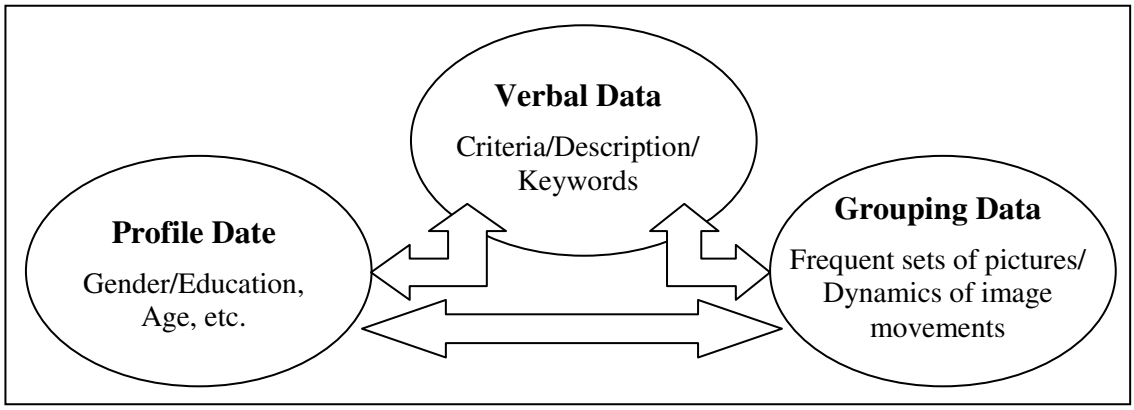

Figure 5: Interaction of three data: profile, verbal and grouping data.

Table 2: Data format for results from interviews.

Subject	**Image Number**				**Verbal Data (Criteria/Attribute/Keywords)**		
Group I							
Group II							

This is easier to explain with examples. There are two subjects in the example, Subject 14 and Subject 40. Subject 14 grouped the first group with images 3, 5, 6, 11. Verbal data allocated to this group was "cut wood", "human influence" and "not natural". The second group and following groups for Subject 40 were listed in a similar manner. It was first identified which images are frequently combined, such as 5 and 6, and 9 and10 in the dotted and black circles, respectively (see Table 3). At the second stage, it was tested whether there are unique rules that explain these frequent sets of images, such as "autumn" in this case. Thus, rough sets rules are formed that "If {autumn} then images 9 and 10". In a similar manner, the profile data is applied to see whether there are any unique rules and it was also tested to find out whether there are any rules with gender, nationality, or education. Due to time limitation, priority was given to finding rules with verbal and grouping data rather than profile data (Table 3).

Table 3: Example of results from interviews.

Subject 14	**Image Number**				**Verbal Data (Criteria/Attribute/Keywords)**		
Group I	3	5	6	11	Cut wood	Human influence	Not natural
Group II	2	9	10	17	Autumn-like	Tree landscape	Beautiful

Subject 40	**Image Number**				**Verbal Data (Criteria/Attribute/Keywords)**		
Group I	1	5	6	7	Wild	Scary	Mysterious
Group II	8	9	10	13	Autumn	Nostalgia	Sad

3.2.3 Sense of familiarity questions

The last stage was designed to find out the interviewees' understanding or sense of place. The participants were confronted with two questions: "Where do you think the pictures were taken?" and "Which picture (or group of pictures) was most familiar and which was the opposite?" With the first question, it asked whether the interviewees had an idea where (country, area, region or idea) the pictures were taken. The question is not "which country or area" as the range of perceptions for these images are to be examined. As for the latter familiarity questions, several other words were added in explanation. The added phrases are either "feeling at home" or "homely" for the familiarity and 'exotic" or "foreign" for the opposite feeling pictures. For both questions, the interviewees were allowed to answer with a separate single picture or with grouped pictures.

These questions are aimed to contribute to the discussions of "space-place" and "sense of place" that are gaining attention in environmental politics. The photo contests are understood as one of the processes where meanings are attached to certain spaces. The distinction between the two is articulated by Lipovac (1997:5; referring to American geographer Yi-fu Tuan):

> *"...when space feels thoroughly familiar to us, it becomes place. The questions are: What does it mean familiar? When someone can say I know this place? Is it when a person is able to put his own intimate boundaries around the space, the boundaries that help bring the image of the identity of place and identity with place?"*

It is clear from this quotation that there have been discussions on 'place' in other disciplines, such as human geography and landscape research, while largely overseen in forestry scientists. There is one ongoing project in the Canadian Sustainable Forest Management Network (SFM) named "Understanding Forest User's Sense of Place: Implications for Forest Management", which is one of the first forestry projects related to place, together with this research. The terms used in this discussion varies from "place making", "selling place", "sense of place", and "sense of self-in-place", "cultural construction of the 'place' of trees" (Cloke and Jones, 2000). The recent move is that these concepts of place are not only discussed in abstract theory in globalization context but also regarded as *"a powerful tool for adapting policies and information to particular constituencies"* (Cantrill and Senecah, 2001). The discussions of places and sense of familiarity will become more necessary as the recreational function ("Erholungsfunktion" in German) and PR of forestry institutions become more and more important. Driven by changes of social demands toward forestry institutions, systematic and strategic advertising and analysis of the visitors and institutions are forecasted.

It is true that the definition of 'place' is a vague and elusive one. Rapoport (1997) found the term "not useful but actually counterproductive" due to its excessive generality, even when the term is increasingly becoming popular. On the other hand, Escobar (2001:141) found: *"the critique of place in anthropology, geography, communications, and cultural studies of recent times have been both productive and important, and continues to be so",* especially in relation to globalism and localization. Naturally, over-use of the term would need more clarification and caution in applying

these terms. Along with the term "governance", usage of 'place' will need categorizing just as sustainable development and landscapes have gone through. Cloke and Jones (2000:162) see the term as the *"manifestation of 'dwelling', where all manner of elements — people, artefacts, animals, plants, topography, climate, culture, economy and history — are knotted together in an utterly unique way to form unfolding space-times of particular landscapes and places"*.

The authors use the concept of the term 'place' for comprehending two concepts: time and community. This paper aims to serve as the basic material related to "place" and "familiarity" to start discussions on developing strategic and systematic approaches in forestry science.

3.3 The Process of Choosing Pictures

3.3.1 Introduction: Why not random sampling?

In the following section, the process by which photos were selected for interviews is described in chronological order. The purpose is to explain the sampling procedure used to obtain photos for the interviews that were conducted for this study. A pre-testing stage was conducted, in which both positive and negative first impressions from the interviewees were noted. These reactions (including those of perplexity and initial rejection) and other comments provided by the interviewees were taken into account and contributed towards the development of the final sample of photos used for this study. A review of initial impressions from interview subjects in the pre-testing session revealed that the primary obstacles perceived by the interviewees were those of an overwhelming amount of photos to evaluate and the varied image-quality arising from different photo contest sources. As a result, the final pictures for this study were chosen in a way that data from interview subjects could be collected efficiently and with as few distortions as possible.

The aim of this project was to discern what perceptions of categories of forest or individual tree images are commonly shared by Japanese and German-speaking society. In order to develop a logical methodology for selecting photos for testing interviewees, plural photo contests were analyzed by applying a two-step process. First, the rules applied and the common manner in which interviewees grouped pictures from different photo contests were observed. The interviewer would supply instructions to the interviewee, but the subject was left to independently determine the origin of each photo and context in which the photo was taken, according to their own experiences, acquired knowledge, and creative imagination. The types of issues that could be addressed at this stage of analysis include raising questions such as: "Is there any tendency for individuals to group images together at all?" "Are the pictures from the same contest/author grouped mostly together?" or "Do teenagers group them differently from the elderly?" It was crucial that the interviewees did not draw conclusions based on physical characteristics and quality of the photos, since this study was concerned with the interviewee's empirical judgment of the image content and not the ability of interviewees to distinguish image quality. Even though efforts were made to select photos of similar image quality, some differences in image quality may have been present because the photos were drawn from a variety of sources. Although differences in physical characteristics among images could not be completely eliminated due to

technical constraints, efforts were made to prevent interviewees from grouping images according to elements of image quality, such as printing, color quality, image size, and degree of detail (number of pixels). The objective of this first step was to identify the grouping trends arising from different selection schemes, forms, associations, or meanings that may arise due to social artifacts and/or influences. The method by which individuals classified images as belonging to the same or different groups was of particular importance.

The final task of this analysis was to interpret the various grouping schemes developed by the interviewees. The aim of this second step was to infer the origins of the developed grouping schemes and to associate them with social artifacts and influences, based on differences such as age and country of origin. The objective is to address grouping criteria and perception of forestry aesthetics of the interviewees into a wider social context, such as their connections to advertisements and the arts.

Bearing these various objectives in mind and in order to reduce influential bias over photo selection by the author, the sample photos were chosen by a method of trail and error for the interviews. The need to control technical quality and the number of pictures became apparent during the pre-test interviews. Given the aim of identifying the shared schemes of forests and trees, the pictures from different contests were required to be comparable in terms of their image content. At first, adopting the random sampling approach may appear to be the best strategy for photo selection. However, the disadvantage of this approach is that all pictures were mixed without any control over which photo contest they originated. An alternative approach would be to conduct interviews using all of the 100 pictures that were available, since this would offer the widest sample with the most statistically meaningful result.

However, both of the aforementioned strategies were not deemed appropriate for the purposes of this research for the following three reasons. The first reason considers the time, labor and financial constraint imposed on an interview, which severely limits the number of pictures that can be shown during the allotted time period. In fact, within the initial trials using about 45 images, a large number of interviewees felt overwhelmed with the number of photos, expressing that there were too many pictures to sort through and group. In this case, the grouping procedure tended to last longer than 30 minutes. In addition, some individuals questioned the quality of pictures after the grouping, which was not the intention of this analysis. From these pilot interviews, the upper limit of photos to be shown during an interview, in order to maintain good communication with the interviewee, was estimated to be approximately 30 minutes per individual interview. In terms of group interviews (more than one individual), more images could be shown and in some cases, it was possible for the subjects to group more than 70 images within a 15 minute time period. However, the quantity of 45 images also seemed to cause uneasiness or alarm amongst some interviewees and the number seemed to be overwhelming to others. Interviewees asking for “hints” in grouping pictures were denied help and such situations were avoided as much as possible, since this study relied on the assumption that interviewees were selecting and grouping photos independently. Interviewees were to group pictures according to their own experiences and imagination, independently of outside influences, peer pressure or the “band-wagon” effect. These effects will be studied and compared in group interviews, separately. The researcher or interviewer was present only to conduct the test and record

responses, doing as little as possible to intervene or influence the choices made by the interviewee.

In order to avoid overwhelming the interviewees, the number of pictures needed to be reduced to what the interviewee considered a manageable number to sort and group. This was one of the disadvantages when compared to the "slide show system" in which interviewees are asked to compare pairs of images shown on a screen at the same time. This process usually proceeds at a faster pace and a larger collection of pictures can be shown, without the interviewee perceiving the pictures as a big "bulk." As a result, interviewees tend to be able to handle more pictures at one time. However, this study did not employ this technique, since the interviewees were given the freedom of forming as many groups as they wished. The task of grouping pictures was more easily facilitated when all of the images were available at once for the interviewee to sort and group into as many categories as he/she wished.

In addition to modifying the total quantity of pictures, the second point concerned the random sampling scheme of selecting the pictures. Adjustment of the weights assigned to each photo contest was considered. Since one of the objectives was to identify the frequency of identified schemes and forms across photo contests, it was appropriate to form a mixture of photos comprising of the same number of pictures from each, thus assigning them the same weight. It was not of interest to identify, for example, trends of grouping photos in general where random sampling would be more appropriate. Hence, it was concluded that random sampling is conducted within the same contest to result in an equal number of pictures from each contest. If the number of pictures available was much larger and if the quantity of photos from each contest was similar, more rigorous random sampling would have been possible. However, in our case, the sources of images were neither large nor homogenous in technical quality. Therefore, complete random sampling was not deemed to be appropriate and the selection of photos had to be carried out in a non-random manner. In addition, since the scope of this study was restricted to examining the perception of forest and tree aesthetics, by restricting the theme to the "forest" and "tree", the total number of pictures from which the sample was derived was restricted to a basic 100 photos. Due to the small base population of forest and tree-related photos that were available to this study, the adoption of a random sampling scheme would not make a large difference in the set of photos that were sampled. If the theme were broadened to "nature" photo contests, larger pools of more than 1000 pictures would be available, from which random sampling could easily be applied.

The third modification made to the photo selection scheme was to assign greater priority to photos that attained higher prize standing. For the "Bäume und Wald" contest, this was not a concern, since all of the pictures were equally treated without any assignment of the "grand prix". In this contest, all thirteen pictures that were available were treated equally and published publicly in a calendar format. On the other hand, the "La Forêt/Der Wald" contest exhibited a strong hierarchical order. The order was apparent in the source from which the photos were obtained, as evidenced by the order of the images shown in the contest brochure and the number of allocated pages for each photo. The images after the third prize were allocated only seven pages, whereas the first, two special prizes, and the second prize were allocated 18 pages, on which larger images were printed. A second justification is that the contest "La Forêt/Der Wald" was the

only contest with plural pictures from the same authors. For example, the first prize consisted of five pictures and the second prize consisted of three. One of the questions that can be raised at this point is: "Are the pictures from the same author frequently grouped together?" Photos from this particular contest were the only source of material that enabled testing this hypothesis. Therefore, it was necessary to selectively sample pictures from the same author in order to test this hypothesis. In order to detect this "same author effect" in interviewee photo grouping behavior, only pictures from the first, second and third prizes of "La Forêt/Der Wald" were selected and a total of 15 images were randomly selected. This also served to reduce the total number of photos selected from this particular photo contest to a manageable number of 15 images. In the "Pefi" contest, 12 pictures of the 29 that were available were selected. In this particular contest, one first prize was nominated and four others were distinguished, but without any prize or ranking. Yet after some months, no first prize was assigned. Although the researcher attempted to give priority to the first prize-winning pictures, it was not always possible to do so, due to the fuzzy award system and problems in quality associated with this contest. During the pre-testing period, it was especially evident that the pre-test interviewees were selectively grouping the pictures of the "Pefi" contest and rejecting them based on technical quality, since interviewees were quick to detect the rough pixels of some of the images. Therefore, it was necessary to selectively sample photos from the "Pefi" contest photos in order to maintain technical quality control among the image sample. First prize-winning pictures were not given as large priority as those photos from the "La Forêt/Der Wald" competition.

Given the three reasons described above, the pictures were not randomly sampled and long interviews consisting of 100 pictures did not take place. A concise summary of the selection process is given in Table 4. The details of each step of the process are also described in later sections. The primary purpose of this introduction is to merely provide an explanation of why a random sampling scheme would not be appropriate, judging from the pre-test experiences and the main goal of this research. Details for particular points are given in separate sections to follow, for example, including the technical quality screening of the "Pefi" contest. Such sections are described in chronological order. The section begins with how the photo contests were selected, how they were technically processed, and finally detailed descriptions are given on how the pictures were selected.

Table 4: Overview of processing three photo contests.

Organizers/Title of Contest	**Original and Post-processed Pictures**	**Modification**	**Justification**
Natural History Museum, Freiburg "La Forêt/Der Wald"	29 reduced to 15	Limitation for high prize (1st, 2nd, and 3 special prizes)	• Priority for high prize by page and image numbers in brochure • Creating "same author effect"
Kreissparkasse, Birkenfeld "Bäume und Wald"	13	None (random sampling)	• No prize hierarchy • Compatible quality
Pefi-Waldstiftung, "Pefi"	70 to 40 (screening I) 40 to 26 (screening II)	Technical quality control	• Inconsistent awards • Low technical quality of the digital images

3.3.2 Selection of the photo contests

In this section, an explanation of how the three particular photo contests used in this study were chosen among various nature and forest-related photo contests is provided. Numerous relevant photo contests from local municipalities, NGOs to UNEP were available. The theme of contests varies from nature in national parks to nature heritage, as well as human-nature interactions. When the theme was strictly limited to "forests/trees", a total of six photo contests remained as candidates. Naturally, many more photos and contests would have been available if the theme had been extended to "nature". In addition, the aim was to identify contemporary forest and tree types in certain types of societies, such as the German-speaking zone. Therefore, Swiss, German, and Austrian photo contests were of special interest to this study. Unfortunately, the researcher was not able to find any photo contests in Austria fitting these criteria and specifically on forests.

The six contests selected are given in Table 5. The latter three contests could not be used as material for this research largely due to accessibility problems. Except for the very last contest, two of them were problematic in terms of their output or publication. In other words, the images were printed either in low quality or were not available at all in printed format. The focus of this research was to analyze photos from photo contests *that reach the public, and send messages*. Consequently, accessibility is crucial for this study, since photo contests are essential when considering their power to appeal to and reach the public at large. Therefore, those photo contests with difficult accessibility or limited availability were not used in this study.

Table 5: A description of six photo contests with the "forest" theme.

	Organizers	**Competition**	**Out-Put/Availability (difficulties in brackets)**
"La Forêt/Der Wald"	Natural History Museum, Freiburg	29 from 2466	Brochure
"Bäume und Wald"	Kreissparkasse, Birkenfeld (Bank)	13 from over 1000	Calendar
"Pefi"	Pefi-Waldstiftung (Pefi Forest Foundations)	5 from 10 to 15	Exhibited in the Internet
"Menschen in der Natur—Walderleben macht Spaß" (People in Nature—Experiencing the Forest is Fun)	Bund Deutscher Forstleute (BDF: Association of German Foresters)	9 applicants, 5 photos	Foresters Magazine, BDF, June 2000 (not published in color)
"Faszination Wald" (Fascinating Forest)	LBV,[a] LWF[b] in Bayern, and NABU[c]	30 from 200	Exhibition in a LWF building (not published)
IFSA Photo Contest at the 29th International Forestry Students' Symposium	International Forestry Students' Association (IFSA)	About 30	Exhibited in the Internet (mixed nationalities of participants; voting decision style)

[a] Landesbund für Vogelschutz (Bavarian Bird Protection Association).
[b] Bayerischen Landesanstalt für Wald und Forstwirtschaft (Bavarian State Institute of Forestry).
[c] Naturschutzbund Deutschland (German Society for Nature Conservation).

The fourth "BDF" contest had publicly published images, but the photos available in the magazine were only in black and white format, which were obviously copies and the original color images were not available. The other factor considered was the circulation of the magazine for both input and output of the images. It was evident that non-forestry public would have little accessibility to the particular magazine due to its limited circulation. Furthermore, participation in the competition was not high with 20 images submitted and only five accepted for publication, with the first prize winner not being from the Landesverband Bayern.

The fifth contest by forestry organizations together with NGOs was an interesting example of a photo contest. Government and NGOs were jointly involved in the contest. The theme was precisely that of the forest, making it an ideal candidate for use in this paper. However, accessibility problems were encountered when attempting to gain utility of these pictures from the forestry organization. Many attempts were made to contact the authority of the photo contest. The response was extremely slow with little information available about the participants of the contest or the level of competition. The winning pictures were not published and extra samples of them were not made available by the organization. Only the original pictures were available and it was not permitted to take photos out of their frames and have them copied. Although photographs were taken of the original prints, the glass surface and wooden frames were obvious obstructions in the field of view and severely impaired the image quality. Due to technical and organizational difficulties, the photos of this particular contest had to largely be abandoned.

The last contest considered was that of the IFSA, which had no accessibility difficulties because all the applicants' images were readily available. In total, 30 images were available on the internet. The clear difficulty was with the international character of the organization (obvious from its name) in that IFSA is an "international" organization. It resulted in the fact that the cultural background of the photos was no longer limited to German speaking countries. The exhibition, parallel to the conference, took place in the Czech Republic. In other words, the photos originated from students coming from various countries, outside the German speaking countries. The other complexity was the evaluating system, or the jury of the contest. All student participants of IFSA were to evaluate and vote for the winning prize. Due to this unique characteristic of the proceedings of the IFSA contest, these photos could not be used for the purposes of this study, since information on the voting system as well as the winning pictures were not available.

For these reasons, the last three contests were not used as study material during the interview sessions. After the final three photo contests were selected for this study, the author randomly selected the pictures and conducted the pre-test interviews. From the pre-test sessions, as previously mentioned, it became evident that not only did the total number of pictures have to be modified to be under 45 photos, but technical modifications with respect to image quality were also deemed necessary.

3.3.3 Choosing the pictures

Once the contests had been decided, the picture images were then selected. Due to the interview time constraints and attempt to avoid overwhelming interviewees with too

many pictures, the total number of pictures used during the interviews was kept to a maximum of 36 images (refer to the rough overview provided in the introductory section). In this section, detailed descriptions of the selection process, such as for "Pefi" will be given.

3.3.3.1 "Pefi" processing

3.3.3.1.1 Lessons from the "Pre-test"

A major problem persisted with the image quality of the "Pefi" pictures and some images had to be selectively edited to improve image quality. As a result, images from this contest could not be treated as images of equal quality as those obtained from the other two contests. The differences in image quality were attributed to the fact that all "Pefi" images were only available online. Although the digital image format offered the advantages of uniform size (width and length) and ease of printing, the relatively low memory-size of each picture (7–25 MB) resulted in low quality of most images, with little room for improvements to be made other than some sharpness and color adjustments. Therefore, pre-screening to eliminate images of noticeably poor quality was necessary for "Pefi".

In addition, four interviews with random pictures taken from "Pefi" were conducted before the selection of the final sample of "Pefi" images was made. Undesirable images from "Pefi" in terms of detectable differences in quality were discarded as "not able to group". The need to somehow systematically coordinate the images became clear in order to fulfill the objective of highlighting the tendency to group images based on forest type. The unintended and undesirable consequence of differing image quality was that physical artifacts, such as color, became important factors influencing sorting behavior. After four interviews, it was clear that snow or black and white formed major grouping criteria. In order to soften these effects, the interviewees were informed to avoid categorizing photos based on being black and white, but grouping according to the black and white quality of images continued to persist.

3.3.3.1.2 First selection session

One hundred images from the three selected photo contests were first reviewed by three researchers (including the author) from different academic disciplines (social science, computer science, and forestry science). The photos were evaluated in terms of their appropriateness for being included in the sample shown to interviewees and discussion was based on the control over image quality, comparing the images of each photo contest to those of the other two contests. This procedure is often practiced in advertisement image analysis, although participants are usually from the same disciple. For example, Wagner and Hansen (2002) asked students with marketing backgrounds to interpret forms of green advertisement. Nevertheless, involving three researchers of variable academic backgrounds was considered to be advantageous to this study, since interview subjects would also come from variable backgrounds.

The initial screening was intended to weed out, at a relatively fast rate, pictures that were considered to be inappropriate for inclusion in the study. Pictures were passed around to each participating researcher in relatively fast motions and quickly approved or disapproved. Prolonged evaluation of pictures was avoided in order to avoid

judgment or bias being made on the image "content" and judgment was based on the comprehensibility of the image and not on other criteria concerning image aesthetics. In other words, the pictures were tested whether or not three researchers could understand, recognize, or make sense of the images. The selection criterion was relatively straightforward. If two of the three researchers agreed that a particular image was understandable and the overall image quality was acceptable, the image was accepted for consideration in the photo sample. After the first candidates were selected after the prescreening process, the remaining pool of images was discussed and ten images were returned if any one of the three evaluators insisted on its inclusion in the sample. The images were reduced to a total of 40, after 15 images were eliminated due to their difficulty in comprehensibility. In addition, images that were interpreted by the three researchers as representing "dead wood" were put into a separate group to be used in a specific section of the interview sessions.

3.3.3.1.3 Second selection session

The second selection session was completed by a female (between 30 and 39 years of age), who was chosen to evaluate the original pool of 100 pictures. The female was randomly selected from the female participants within the institute, who consented to cooperate in this study. This stage of selection was an attempt to eliminate gender bias, as well as comparing selection results from an individual to those from a team of researchers.

The female participant was initially hesitant when shown the amount of images to be sorted and grouped. However, after sorting through the images relatively quickly, five images that were considered to be of significantly poorer quality were screened out. Another 14 images, including all 10 images that were returned to the sample during the discussion phase of the first selection session by the team of researchers was included in this group. Therefore, the decisions made by the team of researchers beforehand and those made by the individual selection process apparently overlapped. Agreement on the exclusion of the particular set of 10 images reinforced the decision of excluding them from the final sample. After the number of images was reduced to 26, random selection took place to determine the final 12 samples.

3.3.3.2 "La Forêt/Der Wald" processing

As mentioned at the beginning of this section, higher priority was given to the higher prize-winning pictures. Two justifications were given. First, the order of the images in the distributed brochure was also deemed to be important. In this brochure, it was evident that the images after the third prize were allocated seven pages, whereas first, second, and the special prizes were allocated 18 pages. Another factor involved leaving the images from the same author by narrowing the choice. Two unique characteristics of this photo contest were that 3–5 sets of images by the same author were printed and black and white images were available. Limiting the choice of photos to the first, second and special prizes was made in order to utilize different pictures from the same author, since multiple images from individual authors were only available in this contest "La Forêt/Der Wald". In summary, the available candidate images were from the first prize (set of five images), special prize for color and black and white (set of two images each), special prize for Freiburg (pair), and second prize (three images). Finally, a final

set of 12 images were selected from the 15 images that were available from this photo contest.

3.4 Overall Evaluation of the Process

3.4.1 Two approaches

In order to evaluate the overall process and control whether appropriate representations from the source (121 pictures) are included in the 36 pictures, two cross-checking approaches were conducted after the selection. In this section, the two controlling methods are discussed separately as to how the picture selection was conducted and how the selected pictures were compared to the "population" that they were taken out of.

The first approach (described in section 3.4.2) is to see the result with larger samples from the sources. The author asked several German and Swiss volunteers, who were willing to spare more time than others, to categorize a larger amount of pictures together with pictures that were thrown out during the process. These interviews are totally separate in time and space from the 50 interviews in which rough sets theory were applied. The results were compared, whether the overall trend of the "core" images with the 36 pictures were compatible with the results of a larger number pictures.

Secondly, the formal criteria of pictures are compared by a group of researchers from different disciplines at the end (described in section 3.4.3). The formal criteria here, means percentage of water or sky in the images, ratio of tree pictures vs. forest pictures, etc. The criteria and keywords that were frequently used in the interviews were given priorities. It was compared, for example, whether the final 36 selections contained roughly the same ratio of the forest and trees as the original 121 pictures.

The question of representations is so crucial for the credibility of the overall research that both approaches are applied. On the other hand, questions concerning the representative nature of the three photo contests were raised at the IIASA presentation. Is it possible to withdraw similar conclusions from other contests? These were already discussed in section 3.3.1, but the limitation of materials with the theme strictly of "forest/tree" were limited, especially when the source is only from German speaking countries.

3.4.2 Grouping with a larger number of pictures

Grouping with a larger number of pictures was conducted both in individual as well as in group interviews. Three individual volunteers and one group of about 10 forestry science students are interviewed, using all of the 121 pictures. In addition to the number of pictures, abandoned materials (images in photographs, color copied) were also added to cross check whether people react differently to different materials. As seen in the number of interviews, cross checking is still in progress and strict tendencies with statistical methods are not applied. However, the description and lessons from interviews are given in this section.

Time constraints caused the pictures to be reduced to 36. In individual cross checking, interviewees spent 5–25 minutes longer (25–45 minutes in total) than in the case for 36 images. In group interviews, the differences were more obvious. The group with 36 images came to conclusions with grouping pictures much faster and discussions seemed to have touched upon forest types. Alternatively, the other group with 121 pictures could not discuss together and the tasks were split. The participants with the larger number of pictures were complaining that they could not discuss together. The pre-tests confirmed the concern that a larger number of pictures were going to take too much time.

As for the grouping results, the main groupings were in general similar. The grouping "dead wood" theme was confirmed with a larger number of interviews as they were strongly grouped together. The image with water was sometimes separated due to the recognition that the printing quality was not very good.

There are two exceptional picture grouping results from this exercise in using a larger number of pictures compared to a smaller number version, namely "details from the forest soil group" and "animal groups". As the number of the photographs increased there were two obvious genres that emerged. One group was based on "details from the forest soil group" that included mushrooms, leaves, fruits and flowers as keywords. The other group was based on animals that included images of birds, foxes, spiders, horses, and deer. The former group influenced the grouping of the pictures of "leaves" and "fruit" images (19 and 34) in the main 36 pictures. These two images were not so frequently grouped together, but they were categorized in all interviews with a larger number of pictures as one group. The same applies for the images with horses and deer (11 and 18) in the main question.

These are interesting phenomena and were unexpected side-products from these interviews. By observing these two groups that were built into interviews using a larger number of pictures, a hypothesis was formed. The phenomena titled "blowing in the wind" occurred in sets of images that were tightly together in a larger number of photographs but not in a smaller number. The hypothesis built on how the images are moving around in the main interviews when the pictures are limited to 36, and their "mother group" of details or animals is not large enough. The hypothesis is as follows:

- Images with details or animals are frequently grouped together when the critical mass is reached in a larger number. The images that belong to this group move around while the number of pictures with similar motifs is limited to a few.

This will be discussed in detail in the results section. Concerning the representation of the 36 pictures compared to the 121 pictures of which the selected 36 were a subset, the grouping is, at this stage, proven to be similar except for two genres: "details" and "animals". The justification for this is that the aim of this paper is to explore the theme of the "forest/trees". It is true that a certain number of pictures are included emphasizing other aspects (mushrooms, fruits, leaves and animals) under the title forests and trees, and they are not presented in the 36 images compared to the 121 images (or did not reach the critical mass to build their own groups). Having said this, the aim of this paper is to see the forest/tree types or motifs as priority. It should be discussed as a sub-category in the future as to what kind of animals, forest products or

details are presented in photo contests. Additionally, the threshold in the number of images that form certain groups is an important future task from the "blowing in wind" phenomena.

3.4.3 Comparison with criteria

Several formal criteria that examine the content of pictures are compared and cross-checked between the selected 36 images and the 121 images in the population. The comparisons were conducted by an economic geographer, a sociologist and an anthropologist. The criteria consist of two styles, formal and content related. Formal criteria are related to the physical character of the photographs and are less related to the content (Table 6). Words listed in the left column are the formal criteria that are compared and their definitions are listed on the right.

Table 6: Formal criteria compared between selected pictures and population.

(1) Horizontal–Vertical	Orientation of photo: whether the original image is presented horizontally or vertically for the viewer is examined
(2) Proportion of black and white images	The percentage of how many black and white pictures are included is cross examined
(3) Images that are blurred, not sharp	The number of images that are misty or blurred
(4) Single pictures, pictures in one work	The ratio of single pictures against works that consist of plural pictures (mainly from "La Forêt/Der Wald")
(5) Pictures printed small in original	Pictures that were printed relatively small (less than half of the card, about 60cm^2) in the original source are counted (images only from "La Forêt/Der Wald" is compared as other two were all uniform in size)

The results of cross checking are listed Table 7. The ratio was not too different except the last criteria "small size". This needs explanation in context with the priority to higher prizes in this contest. The size of the images in the brochure "La Forêt/Der Wald" is smaller for the images with lower prizes. The priority on higher prizes caused the different proportion for the pictures of small size in selected groups and populations. As discussed in the picture process, this was necessary to test other hypotheses (in same author effect and award hierarchy).

Table 7: Results of comparing formal criteria.

	36 Pictures	**Population Pictures**
Horizontal–Vertical	21 (horizontal)–15 (vertical)	67 (horizontal)–54 (vertical)
Black and white	7 (19.4%)	19 (15.7%)
Blurred or not sharp	3 (8.3%)	11 (9.1%)
Single–Plural pictures	10 in plural works (27.8%)	25 (20.7%)
Small size	3 (25%)	10 (40%)

The next comparison is related to the theme and contest of the pictures. There was more risk of subjective judgment here, so the criteria were chosen that were agreeable and acceptable to the three researchers. The content here means percentage of the water, sky containing images, ratio of tree pictures vs. forest pictures. The criteria and keywords that were frequently used in the interviews were given priority. It is compared, for example, whether the final 36 selections contained roughly the same ratio of the forest and trees. The other issue that was raised in the previous section was the representation of "details" and "animals". These genres were cross-tested by the researchers, to see how different the ratios were in selected groups in the population. Sky and snow were chosen from the list of frequently expressed words that, in addition, are relatively easy to identify in the pictures (Table 8).

Table 8: Content criteria compared between selected pictures and population.

Forest–Tree	Images using forests are compared to those emphasizing single trees; the evaluation of ambivalent images was done through discussions
Images with the theme dead wood or cut wood	The number of pictures that contained dead wood was calculated; dead wood includes broken trunks, lying trees, and cut wood obviously from human activities; images that show bare twigs and roots were not included
Images with a large proportion of sky	Images that contain roughly one fourth of sky in the surface were counted
Image with snow	The number of images in which snow was recognized were counted
Theme: Details/Products	The ratio of images with the theme "details" were compared
Theme: Animals	The images including animals were counted and compared

The first four categories are surprisingly well matched. The representation of forests is somewhat larger than the population. The two issues that needed examination showed a contrast in the "details/products from the forest" that animals are actually overly presented, while details/forest products are under-represented by 50%, respectively. This is interesting as both of these are not very stable grouping categories. As mentioned earlier, the details and animals are not the main focus in this initial study, therefore analysis of these two genres must wait.

In addition, the categories and number of pictures need re-examination by separate interviews with the public. The rough figures are given here only to examine whether the presentations are approximately acceptable or not (Table 9).

Table 9: Results of comparing content criteria.

	36 Pictures	**Population Pictures**
Forest–Tree	Forest (13; 36.1%) Tree (18; 50%)	Forest (34; 28.1%) Tree (61; 50.4%)
Dead wood/Cut wood	5 (13.8%)	15 (12.4%)
Sky	7 (19.4%)	17 (14.1%)
Snow	4 (11.1%)	15 (12.4%)
Detail/Products from the forest	2 (5.5%)	17 (14.0%)
Animals	3 (8.3%)	6 (4.9%)

3.5 Technical Process and Quality Control

The following section describes how the pictures were reproduced from their sources and Table 10 summarizes the techniques that were used for reproducing the images from each photo contest. Except for photos from "Pefi", which were of uniform size from a digital source, "La Forêt/Der Wald" and "Bäume und Wald" were both printed sources with images of variable sizes. Since "La Forêt/Der Wald" was available in brochure form, most images required enlargement, whereas "Bäume und Wald" was in calendar format and required significant reduction in size. Both "Bäume und Wald" and "Pefi" were adequate in terms of image quality, although "Pefi" was limited in terms of digital size, which made it more difficult to improve image quality.

Table 10: Reproduction techniques applied to photos from three contests.

	Process	**Difficulty**	**Reproduction**
"La Forêt/Der Wald"	Enlarge	Different width-length	Color copy; partly color printed
"Bäume und Wald"	Reduce	Different width-length	Color printed
"Pefi"	Original size	Low quality	Color printed

Three different forms of reproducing images were considered:

- Color copying the images (high quality but expensive);
- Scanned/digitized and laser color printed (middle-low cost with middle quality); or
- Scanned/digitized and into photo format of 10 × 15 cm with a photo developer (inexpensive but low quality).

The advantage of the third option was that the image would be reproduced in a form of a photograph, although the size of the reprint would be smaller than the original. However, this option was abandoned due to the obvious scanned surface appearance of "La Forêt/Der Wald", as well as the misalignments of image dimensions of "Bäume und Wald" resulting from different width-lengths that produced images that were slightly cropped. The latter problem arose due to the mass production system of the photo developer, which made it impossible to make fine adjustments to the image production due to the lack of control exerted over the reproduction process.

In order to avoid distortions of image dimensions, color printing was the most preferred reproduction option that avoided changing the width-length ratio of the photo, while maintaining image quality. In terms of image quality, the color copy with professional hand editing was the most preferred form of image reproduction.

However, it should be noted that an exception was made for "La Forêt/Der Wald". In order to keep the image quality roughly consistent between images, the "La Forêt/Der Wald" was color copied with high cost, whereas "Bäume und Wald" and "Pefi" were printed with a laser printer. Although the photos from "La Forêt/Der Wald" were reproduced using a superior printing technique than that used for the other two contests, it was also taken into consideration that only the "La Forêt/Der Wald" images required enlargement. Since enlargement predisposes the quality of these images in the first

place, a superior reproduction technique was necessary for these images in order to avoid further degradation of image quality. In addition, "La Forêt/Der Wald" originals were printed on a special plastic paper, which often resulted in noticeable surface reflections when scanned. Furthermore, "La Forêt/Der Wald" was the only contest from which black and white images were obtained. Reproduction of black and white images proved to be difficult in terms of maintaining consistent brightness and contrast. From the aforementioned three reasons, such as paper quality and the process of enlargement, the high cost color copying process was used for reproducing the "La Forêt/Der Wald" images. In some cases, the authors of the pictures voluntarily sent digital copies of their images. In these cases (two images from "La Forêt/Der Wald"), the images were color printed.

4 Results

4.1 General Results

In this section, the results of 50 interviews are presented. The results are discussed in three parts, according to the manner in which the interviews were divided, since different methods were applied to different sections. The dead wood preferences and familiarity questions of the images are either descriptively discussed or a logistic regression is applied. Rough sets theory was applied to the main portion involving grouping exercises. In addition to the main results collected from the interviews, the interactions with interviewees and contributed comments or suggestions with respect to the subject material, were noted and proved to be constructive experiences in light of the research framework. These reactions and suggestions of the interviewees were included in the gathered results and are presented here as brief descriptions at the beginning of each results section.

The most provocative materials from the grouping results were non-verbal. However, it could not be said that the results from the recorded picture groupings included statistically significant trends and rules. The statistical significance of the results was of secondary importance to the actual meaning of the results that were obtained. The primary importance was that the results provided a starting point in which discussions relating to forest aesthetics could then be initiated, rather than dwelling on the scientific credibility of the results. The most frequently grouped sets of images were identified and determined to be the most representative sets to be studied. The potential function of these motifs will also be discussed and further elaboration will be included in the future tasks section of this paper. It is hoped that the image motifs developed here will have potential applications in the fields of PR, public advertisement, and other purposes of forestry institutions, in general.

The second result of the interviews in terms of grouping pictures was the verbal information contained in the data bank itself (not yet linked to the grouping results). According to the recorded results, about 400 different words were expressed in describing the developed groupings. The words used for grouping criteria were mainly seen as representative of feelings, categorizations (landscape, tree, forest), seasonality, and formal visual (color, shape) criteria. Contrary to what was expected, the expression

of reasons, keywords and criteria appeared to be more difficult and challenging for most interviewees, especially when they were required to contribute three terms. The variety of describing words also potentially offers a new research possibility. The words were stacked together in a less sophisticated manner under the imposed time limit, but there was also the potential to explore the meanings of such words on a linguistic basis. In this paper, the broad overviews of the words are presented, as well as what sort of words were used, and how often (i.e., the frequency trends).

The third stage of the results addresses the rules and tendencies between the former two data sets containing grouping results and verbal describing words data. As the verbal data became so large in volume, the number of words had to be reduced drastically (from over 400 to 13), in order to make them amenable to analysis. After this drastic reduction, several rough sets rules were discovered. The promising results indicated a grouping behavior according to gender differences. This result remains to be proven on a statistical basis.

The results gathered from posing the familiarity questions show that participants had only a limited idea of where the pictures were taken. Alternatively, there was a clear tendency for people to group according to what was more familiar or less familiar.

When addressing quantitative results in general, there were few significant findings when using statistical and knowledge discovery tools for interpreting the results. This was true for both the analysis of dead wood preferences and the application of rough sets theory for the picture groupings. One potential factor could be attributed to the limited number of interviews conducted or the limited data set submitted for analysis. A second factor was the degree of freedom in the analysis, which was purposely high for the purposes of this paper. The third factor also relates to the high degrees of freedom in that the process of stacking words required improvement in order to find the relationship with wordings and groupings. In other words, the main results that were used for further discussion primarily dealt with the grouped pictures and their characteristics. Unfortunately, the results for the wordings and criteria data will not be addressed here, since considerable improvements to the interview process will be required in order to discuss them in a meaningful way.

On the other hand, the key element of this paper lies at the level of methodological experiment, as well as the material being analyzed. The qualitative results of the research in verbal data, or dead wood preferences serve as starting points in re-examining the underpinning norms that existing works in forested landscape preferences studies are attempting to address.

4.2 Results from Dead Wood Preferences

The overall result of posing the dead wood preference question was roughly half of the pictures being associated with positive feelings and 40% of them associated with negative feelings (the remainder was neutral). This result is surprising when we consider how much investment forestry institutions contribute towards putting dead wood images in a positive light. As explained in the methodology section 3.2.1, it is obvious that forestry institutions are promoting these types of images in museums and

commercial billboards with the purpose of sending out the message that "dead wood is good, even beautiful". The images were all taken from prize-winning photo contests, in which the hosting organizations regarded the dead trees as aesthetic objects. The results of this survey have significant implications on the current German forestry policy, where the "Dead wood concept (Totholzkonzept)" is portrayed as an obvious positive image among foresters.

The exact findings ranged from 32–44% for negative feelings and 30–48% for positive feelings. The exact figures obtained are of less significance when considering the fact that there is no clear consensus among the public (or amongst environmental oriented scientists at IIASA) of whether dead wood should be preferred. The negative terms that were frequently mentioned were those of "destruction" (occurring five times) or "pollution" (three times), which implied human influence or intervention in the depicted scene. More specific cause and effect terminology were also mentioned, such as "acid rain", "insects", and "eutrophication". Other terminology, including "sickness" (four times), "natural damage", and "not healthy" (twice) and "storms" were also referred to at least once. The terms "neglected nature", "deserted", or "not taken care of" (twice) were interesting terms, as they compare the scene to a predetermined norm and suggest that some authority should be intervening. Typical terms mentioned that connotated a positive feeling were expressed as "untouched" (four times). The positive feelings conveyed by interview subjects were generally more diverse, including vague expressions of "good atmosphere", "romantic" and "naturally fallen" (twice). One interviewee mentioned that they were sad pictures in the sense that they show death, but added that they also indicate hope that new life is beginning. The six images that were used for this section of the interview are shown in Figures 6 to 11.

Figure 6: First price winning photo from the Pefi photo contest (image D-1). Photographed by Monika Ondreka at Ober-Mörelen (D), awarded April 2001.

Figure 7: Prize winning photo from the Pefi photo contest (image D-2). Photographed by Martin Mägli at Heimberg, awarded March 2001.

Figure 8: Prize winning photo from the Pefi photo contest (image D-3). Photographed by Peter Henauer at Luzern, awarded September 2001.

Figure 9: Prize winning photo from the Pefi photo contest (image D-4). Photographed by Monika Schaad at Aarberg, awarded December 2001.

Figure 10: Prize winning photo from the Pefi photo contest (image D-5). Photographed by Dieter Sommer at Erfurt (D), awarded May/June 2001.

Figure 11: First prize winning photo from the "Natur Natur sein lassen" (image D-6). Photographed and copyrights by Georg Stahlbauer.

By splitting all of the answers into positive/negative/no-answer categories, a statistical methodology was applied. Regressions were calculated based on a binary choice model (LOGIT) to see whether any attribute correlated with the preference of dead wood results. Even after all the images were stacked, there was generally no significant effect noted. These results were expected, since the data of 50 interviews constitute a small data size, barely enough to compute such preferences. In order to determine any significant trends, more interviews will need to be conducted. The most promising sign was shown in education, but it was not enough to be statistically significant. Table 11 shows the results of this analysis. The "significance" threshold is 0.05, which none of the criteria have appeared to have reached.

Table 11: Logistic regress "dead wood".

	Effect	**SE**	**Degree of Freedom**	**Significance α**	**Expotential (B)**
Gender	-0.59	0.322	1	0.856	0.943
Education (environmental science)	1.113	0.438	1	0.11	3.043
Age (20–29)	-9.692	40.678	1	0.812	0
Age (30–39)	-11.068	40.678	1	0.786	0
Age (40–49)	-0.779	45.410	1	0.986	0.459
Age (50–59)	-9.052	40.678	1	0.824	0

In addition, a Chi-square computation was implemented in order to cross check the results. A contingency table was formed and the data collected simultaneously for two variables (positive-negative, but sometimes three including "neutral") were entered. Chi-square statistics is one of the most common means of analyzing contingency table data (Zar, 1974:60). The Chi-square test can examine the hypothesis that certain preferences are independent of variables or not significantly independent. In the case of this study, two hypotheses were tested, namely whether dead wood preferences were independent of age or alternatively, independent of gender.

Due to technical and time limitations, the pictures were not appended together in this test, but each image of D-1 to D-6 was individually examined. Due to the skewed age profile of the interviewees towards the younger generation, two tests were conducted. One test considered five age groups, whereas the second test consisted of three age groups. In addition to the age variable, gender was another variable that was tested. The results of a Chi-square test can point to only one of two conclusions:

(A) We can reject the hypothesis that it is independent, but the Chi-square test value should be much smaller (then results would be clearer).

(B) We cannot reject the hypothesis that it is independent, but we also cannot say that it is independent — we need more data.

In either case, results of the tests were similar to those of the LOGIT in which more data was required in order to examine clearer trends. A further test checked whether the possibility of a low probability event existed, and all of the results from the Chi-square test value were above 0.01. Even though some tests indicated lower probability with less than 0.05, the result is considered useful only when the probability is relatively small (the Chi-square test value being lower than 0.01 or even less). Table 12 provides the results for this analysis. The interpretation is abbreviated as (A) or (B). Table 12 (i) includes test results with five age groups: 20–29, 30–39, 40–49, 50–59 and 60–69, while (ii) shows test results of three age groups: 20–29, 30–39 and 40–69; and (iii) shows the significance of the differences between genders. The most significant tendency is indicated from the results of the three age group tests. Least significant were the results with gender as a variable. The results agree with the tendencies observed during the interviews for the older generation to react negatively towards the pictures. Although it still needs to be confirmed on a statistically significant basis (by performing more interviews), the most prominent group that tended to negatively react

to the pictures was the mature male group. Most of this group jumped to the conclusion that the dead wood images were results of environmental destruction.

Table 12: Chi-square testing.

Picture	Test Value	Comment
(i) Chi-square testing with five age groups as a variable		
D-1	0,073487224	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
D-2	0,112333259	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-3	0,014776242	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
D-4	0,026615061	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
D-5	0,157625028	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-6	0,039734366	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
(ii) Chi-square testing with three age groups as a variable		
D-1	0,032692636	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
D-2	0,07202237	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-3	0,006073664	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
D-4	0,006614861	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
D-5	0,110709869	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-6	0,023232776	(A) We can reject the hypothesis that it is independent, but Chi-square test value should be much smaller (then results would be clearer)
(iii) Chi-square testing with gender as a variable		
D-1	0,796241905	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-2	0,65253001	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-3	0,446124279	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-4	0,497241036	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-5	0,485103289	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data
D-6	0,485103289	(B) We cannot reject the hypothesis that it is independent, but also we can not say that it is independent — we need more data

One interesting remark was made by an Austrian technician, who commented: *"the pictures (of dead wood) would be nice to have in a nature conservation area, but I would not like to have them in forests that I own"*. This remark raised the question of "whether we should be giving more instructions or context" to the interviewees. This was the only incident in which an interviewee asked for contexts or purposes for grouping the images. On the other hand, the individual was also a forest owner himself and showed expertise in forestry, as well as a strong interest in the subject material. Therefore, it is difficult to regard him as a good representation of public interests. Yet, the question that the individual posed requires further consideration and will be discussed further in the "Future Tasks" section.

Another future task in German forestry science is to further examine how dead wood images are perceived by the public. Presuming from results gathered from the Austrian interview subjects, the idea of dead wood was self-evidently considered a positive issue and this concept needs to be re-examined in the future. The purpose of the interviews was not to formulate a predicting model, but to gather data for further analysis. The results indicated (unintentionally) similar results of a predicting model in which the generation group or people with certain educational backgrounds would be more likely to be positive on dead wood issues. In short, dead wood preferences certainly was a good starting point to reflect on the way forestry scientists and institutions communicate with the general public. It was obvious that the concept for the forestry industry was received with mixed reactions from the public.

4.3 Results from Grouping, Categories and Rough Sets Theory

4.3.1 Three levels of results and reactions from interviewees

There are three components of the second phase that deserve to be addressed in a separate results section of their own. The first component is the resulting grouped pictures that were considered to be mostly independent of verbal communications. The main results of this study were the results from the grouping exercises. The second component is the rich data bank of expressed words that was collected. The third component deals with the relationship between the grouping results to the verbal data of the criteria as well as the profile data of the interviewees. Besides these main components were results of the recorded reactions and refusals from different interviewees. Even after the improvements made after the pre-test interviews, there were a few difficulties remaining. These notes given before the main results section aim to serve as contributions to developing future research frameworks, especially with respect to the nature of the interactions with interviewees.

The first component of the results with image groupings (section *4.3.2*) is of special importance, since data collection is tentatively planned to continue in Germany and Switzerland hereafter, while making amendments to conducted verbal interviews. In other words, the results of groupings are likely to be transferable in continued research, while procedures implemented for the second and third components for verbal data and connection data will be changed. The first component was considered to be robust in comparison to other results, since the results were less dependent on verbal

communication with researchers and interviewees. This could also be a critical difficulty with the second and third components.

As mentioned earlier, reactions to the given explanations of the forest images were also recorded as parts of the results of the conducted interviews. Limited instructions, or the purpose and background of the research were given prior to the interviews due to methodological reasoning. Only in one case did the interviewee ask: "Do I have to give reasons?" A similar question was raised near the beginning: "Do I see them as forests or as pictures of forests?" In this case, the response was to see them as pictures of forests, since the focus was on cultural representations of the forests. Another question raised concern about the duration of the interview, inquiring whether there was any time limit. Few interviewees asked for comparison of grouping tendencies of other interviewees in relation to their own formed groupings. Feedback was given to those who requested it, as well as explanations on what the purpose of research was and the general tendency in groupings (only after some results were computed). Subjects also contributed non-verbal responses. Some participants preferred to preview the whole group of pictures, usually applying this technique to the final group of pictures that was considered to be difficult to separate. There was one case in which one forest scientist rejected to categorize one picture. When giving the reasons at the verbal data stage, some interviewees reacted that the three describing words were too many to request at that stage. In some cases, the interviewees insisted that there was only one criterion for a certain group. Most of the difficulties were overcome by the interviewees supplying synonyms for the criteria, such as adding "positive" to "good atmosphere". The question of context and purposes for grouping were not questioned at this stage, while it was once raised in the dead wood preference section. This is important when considering the validity of the results in the following section, where minimal intervention (or instructions) was asserted by the interviewer, thus leaving the interviewees with a high degree of freedom. Leaving room for freedom did not result in any rejection of the images or expression of confusion, but the interviewees succeeded in grouping all of the images, building their own purpose or criteria, based on their own judgments and experiences.

4.3.2 Results from grouping

The first component of the main results was the data attained from the groupings of images. The result from grouping was examined first in the light of three hypotheses, testing whether there was any specific factor influencing the grouping behavior (i.e., photo contests, author, or profile of interviewees). The grouping results were of key importance as they resulted from independent choices made during the interviews. It was only in the next stage when the researchers asked for descriptions of criteria, when verbal contributions from the interviewee served as a tool of communication. At the grouping stage, however, the grouping was conducted with minimum verbal interaction based on the experiences and images that the interviewees had of forests.

The first characteristics of the grouping exercises reflected the different contests from which the images originated, since pictures from different contests were frequently put together in the same group. This leads to the rejection of the first hypothesis in section 3.2.2. However, the second hypothesis regarding dependence of authors or the attribute

of photography was not clearly rejected, as it was in the case of the first hypothesis. Black and white images from the same author were more likely to be grouped together (supported 41 times out of 50). Another pair of images from Taiwan by the same artist was also frequently grouped together (supported 39 times out of 50). It is difficult to judge whether the factor of having the same author influenced the grouping behavior or whether other factors, such as black and white print or the locality of the image had larger influences. The final hypothesis on relationships between interviewee profile and grouping tendency was judged to be too complex to be computed in great detail. Nevertheless, some rough sets rules were calculated in the following sections depending on gender. Yet, no statistically significant data were obtained accounting for age, nationality, gender or educational factors. The results were compared to the hypothesis given in section 3.2.2. The shortened versions are listed below:

- The grouping will be strongly dependent on the source or the photo contests.
- The resulting groups will be dependent on the attribute of the photography and photographers.
- The grouped pictures will be dependent on the attribute from the interviewees.

Two of the hypotheses were rejected from the results of the frequently grouped images, except for some features in the second hypothesis. Even the second hypothesis was not a strongly supported trend in the data, since only five out of 17 frequent sets of images (with a threshold of 35 supports out of 50) were accounted for. Therefore, it is concluded that the groupings were based more on the forms and content of the images than the effect of the sources of images (photo contest, author) or profiles of the interviewees. This confirms that the grouping exercise successfully led interviewees to group the images according to the purpose of the research. If the contemporary icons of forests appear in different photo contests, they are likely to be grouped together and appear relatively high on the frequently grouped sets of images.

One additional hypothesis is raised, which was added during the cross-examination sessions described in section 3.4.2:

- Images with details or animals are frequently grouped together when the critical mass has reached a larger number. The images that belong to these groups moved around, while the numbers of pictures with similar motifs are limited to a few.

This issue is still being pursued, but it is clear that the leaves and fruit picture that both belonged to the “detailed group” were not frequently grouped together, even with a threshold of 25. Additional interviews with 121 images need to be conducted in order to confirm the trend, but the paradox is likely to exist. The group with detailed images of leaves, mushrooms and animals were grouped together when the number of pictures was larger, and the group collapsed when critical masses were not reached. In either case, this leaves room for future tasks to be performed, addressing how many different genres and categories should be included under the content of forests and trees. Animals and products from forest or forest soils are presumably important factors for the forest ecosystems. As the purpose of this research is limited to types of forests and trees, the explorations on this topic are not further pursued at this point, leaving room for future research to be performed.

The most frequently grouped images were identified for the overall group of pictures, as well as for each nationality group of interviewees (see Figures 12 and 13 for images 11 and 20). A certain pair of images from different photo contests and different authors was strongly supported across different gender, nationality and educational backgrounds. The pair exhibited a common motif of light penetrating into a dark forest. One of these images was from "Bäume und Wald", an image that was used for the month of July. The other picture was selected from one of the three sets of images that were awarded second prize in the contest "La Forêt/Der Wald". The occupation of the authors for both images was incidentally made known through direct contact via e-mail or through direct communication of the contest organizer. The former image was taken by a forester while the latter was taken by an academic staff member of a university. Therefore, they do not have much in common when we consider the profile of the photographers. As for the content, both images shared the characteristics that the forest consists of straight trees and the surface of the trees is all dark. The two components of light coming towards the viewer and the presence of dark tree trunks were the striking characteristics of both images. On the other hand, it is interesting to note a couple of the differences between the two images. The most significant difference was the presence of leaves. While one image portrayed greenish leaves bathed in sunlight next to the trunks, the other exhibited hardly any leaves. In addition, the latter had weeds or algae on the ground. Another difference was that one image had a deer (or its shadow) in the image, whereas the other image had no trace of the presence of animals. The existence of the deer was often not expressed by the interviewees, since its presence was relatively small. Despite these differences, the pair of images was by far, the most frequently grouped images. Further research is required to explore how robust this set of images is in a variety of situations. In other words, are the two images consistently grouped together, even if certain purposes are allocated to the groupings? What happens if the number of pictures with animals increases? These questions need to be answered in future research. It is sufficient here that certain forest types appear in the grouping supported by a large number of interviewees. The main purpose of the implemented research was largely successful in that photo contests proved to be one approach of sharing motifs in contemporary society.

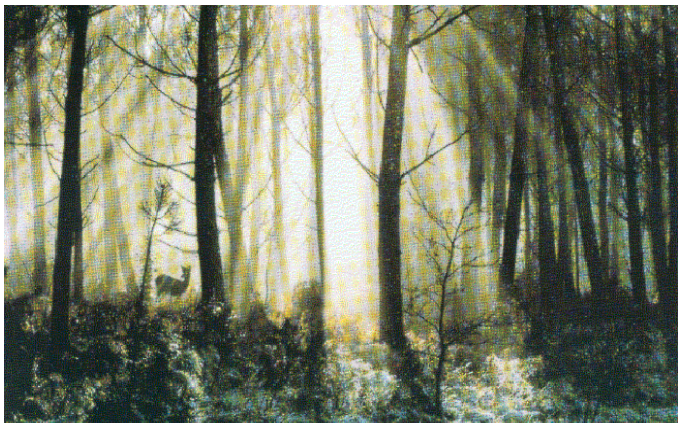

Figure 12: "Biche" second prize from the contest "La Forêt/Der Wald" (image 11). Photographed by Jean Lochet, who permitted this reproduction.

Figure 13: "Forstrevier Birkenfeld" from the contest "Bäume und Wald"; July in the calendar (image 20). Photographed by Konrad Funk, who permitted this reproduction.

There were three sets of images that ranked second in the frequency of grouping (see Figures 14, 15, 16, 17, 18 and 19 for images 3, 4, 23, 25, 21 and 33). One was a black and white set of images from the same author in the same contest, "La Forêt/Der Wald". The other two sets were sets from "Pefi" and 'Bäume und Wald" mixed together. The black and white sets of images emphasized the roots of trees with their trunks visible. These sets of images appeared in the last section of main results from rough sets theory analysis, when an attempt was made to see any profile data and verbal data rule to the grouping of these two images. The other two sets of pictures show different characteristics. One shows trees with overwhelming colors of autumn (or some mentioned late summer) leaves. One image had yellowish leaves, whereas the other tree was red in colour. The tree with yellow leaves was used as an image of October in the calendar printed from the contest "Bäume und Wald", and the image with red leaves was awarded first prize in October 2000, in the "Pefi" contest. The other pair did not coincide in their exact season, since one was used for the August image of the calendar for the contest "Bäume und Wald", while the other was awarded in September 2000, but they are relatively close. It is more probable that the obvious similarities between the two are related to content, which shows human influence or anthropogenic uses of the forests. They both show the trunks cut in a form that indicates obvious human impacts taking place in these scenes.

There were a couple of interesting comments made during the interviews. One lady even formed her own hypothesis that the frequent motifs that appeared in the groupings depended on the time era, rather than nationalities or gender. According to this interviewee, the most frequent sets, for example, were often used for the symbol of "Millennium", while the other pairs with a single tree on a hill reminded her of the 1980s, when American photographer Ansel Adams was booming. Another interviewee suggested that religion may also play a central role, since the most frequently grouped sets of pictures resembled a picture in a condolence letter.

Figure 14: "Ohne Title (No title)", first prize from the contest "La Forêt/Der Wald" (image 3). Photographed by Walter Zbinden, who permitted this reproduction.

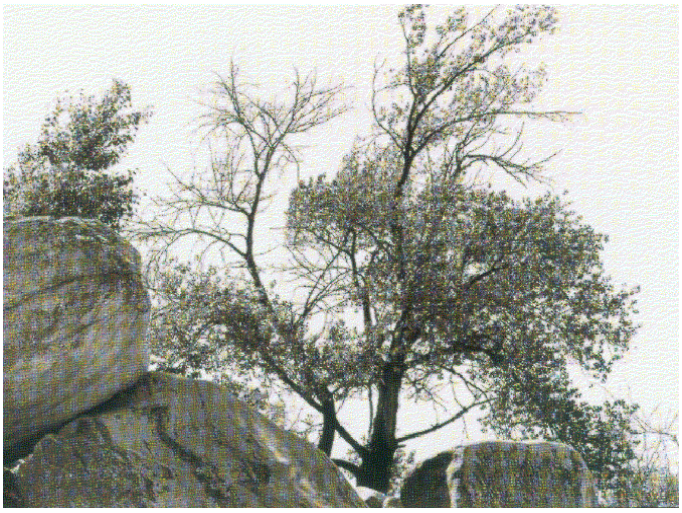

Figure 15: "Ohne Title (No Title)", first prize from the contest "La Forêt/Der Wald" (Image 4). Photographed by Walter Zbinden, who permitted this reproduction.

Figure 16: " Bergulme, Heilligenbösche" from the contest "Bäume und Wald" October in the calendar (image 23). Photographed by Elke Jung, who permitted this reproduction.

Figure 17: First prize winning photo from the Pefi photo contest (image 25). Photographed by Doris Kemler at Langnau, awarded October 2000.

Figure 18: "Staatwald zwischen Kempfled und Allenbach" (image 21) from the contest "Bäume und Wald", August in the calendar. Photographed by Josef Funk, who permitted this reproduction.

Figure 19: Prize winning photo from the Pefi photo contest (image 33). Photographed by Monika Schaad at Aarberg, awarded September 2001.

Having mentioned these remarks on frequent pairs of images, the interpretation of them require more interpretation and reflection. As will be shown in the verbal data results, the interpretation, reasoning and categories for grouping these sets of images were diverse. It is true that concepts of season, human influence and light were some of the most frequently used terms. However, some interviewees mentioned that the most frequent set of images are awesome and frightening, whereas others said that they were romantic and fit for recreational activities. Extremely different views were mentioned for the cut woods and black and white images. For the former, some saw human destruction of the environment, while Finnish foresters felt at home and warmth from the images. The black and white images of the roots evoked coldness and solitude, while others saw strength and survival of life. The aforementioned comments on images are to be further developed in the future when more data and relationships to other data have been computed.

Another future task is to analyze the dynamics of the pictures, once the frequent sets of images have been identified. The dynamics of movement of other images refer to the movement of other pictures surrounding these stable sets of images (or frequent sets of images). Due to time limitations, the dynamics of such studies could not be incorporated into this research framework. Details of future tasks on these topics will be discussed in the last section of this paper.

During the presentation at IIASA, some statisticians pointed out that further examination was required, in addition to conducting a larger number of interviews. One extreme criticism was that “even if all the 50 interviews supported a certain set of images, they are not statistically valid”. We admit that the number of interviews is indeed limited due to the imposed time constraints. Nonetheless, the purpose of providing one of the “starter materials” for discussion on this subject area have been fulfilled, including addressing the question of how much data is needed for such studies. A similar counter argument addresses the critique that all of the interviews were conducted in an “environmentally oriented scientific institute”. The detailed arguments

are already given in the methodology, but it was not the purpose of this research to begin with a completely randomly selected population. The randomness of interviewee selection will be increased in future interviews that will be conducted in Germany and Switzerland.

The bias issue concerning the fact that the dead wood group would be the most consistently chosen group raised in the interviews will now be discussed, including the pros and cons surrounding this issue. Contrary to this concern, interviewees actually responded diversely in the second phase to the dead wood pictures, and "death" or "cut wood" were not necessarily grouped together. Neither were the images with dead wood necessarily grouped together (with an exception where one pair of cut trunks and fire wood image was relatively highly ranked, 14th in the overall set). Additional scrutiny for the influence in the first phase will be conducted after the tentative studies in Germany and Switzerland have been conducted. The resulting groupings of pictures will then be compared with those without the dead wood preferences phase (or those results from studies where the first and second phase orders were switched).

4.3.3 Results from verbal data

The overall number of words used for describing groups was over 400 different words in total. The most frequently used terms were positive (appearing 22 times; same applies to the following numbers denoted in brackets). This was followed by landscape (20), winter (15), season (11), light, color (10), and trees (9). Most of the terms were used only once (380) or twice (63). This was a natural tendency, since no restrictions or limitations were imposed with respect to what terminology the interviewees could use or express. Some words were used frequently and in identical form, whereas others were mentioned relatively infrequently, but similar words appeared very frequently. For example, the exact word "landscape" was repeated 20 times, yet there were terms such as "cultural landscape" (3) and independent landscape, which also included the terms. The terms containing "human" are another example of this. Even though "human influence" appeared only eight times, there were numerous synonyms, such as "human influenced" (2), "human intervention", "human work", "human impact" or "human manipulated". The two terms of "forest" and "tree" are frequently used together with adjectives or other nouns, as in "tree with flower", "tree in group" and "forest as part of landscape". Tree was used in plural form such as in "groups of trees" and "form of trees". These were the terms with relatively frequent repetitions. Colors and seasons were the group with less repetition. The two terms, "fall" (3) and "autumn" (10) overlapped, since they were considered to be synonyms. "Autumn-like", "autumn and winter" or "autumn color" were a few examples with seasonal words with additional information.

As we have seen from the grouping results, the dead wood question at the beginning did not strongly bias the grouping results. Alternatively, the phrasing at the initial stage in asking: "do you see these images positively?" may have influenced the expressed words, because "positive" is the most frequently used term. However, the bias is not as crucial as the verbal data having to be grouped and stacked. The number of words used was drastically reduced before the rough sets theory was applied. The exact wording was considered to be less important for the following phase with rough sets. It was

unfortunate that we could not determine whether the terms “positive” or “landscape” were the most frequent words used. In the future, when additional interviews are conducted without the dead wood questioning section, representative wordings will be compared to the current results. Then a rough estimation will be given to the one that is likely to be frequent, without the beginning part.

One of the enthralling words is “human influence”. Some used the term when they encountered scenes of destruction. Strong negative connotations were given to the term, accompanied with terms such as “exploitation” or “destruction”. More neutral words were “interaction”, “activity” and “access”. The combination of the term “human” and other words were the most diverse sets of wordings. “Landscape” was the most repeated in terms of frequency, but the variation of wording was richer with words including “human”. Apart from the previous example, other terms mentioned were “human being activities”, “human impact”, “human dominating”, “human contact” or “human manipulation”. This wording appeared to have a relatively strong link to forestry issues. It is also understandable that the term "natural" also remained, since the human-nature dichotomy was one of the most frequent criteria. The human influence factor and untouched nature were often separated. As we will see in the following section, the grouped pictures, according to these criteria, were not constant in that all polarized views were expressed to the same image. The remarks on frequently grouped sets of images (see figures in section 4.3.4) were typically inconsistent. Some interviewees mentioned that it was the pristine nature of the image that was identified, while others recognized an obvious human influence in the scenes portrayed in these images.

Given the high variety of the words, it makes more sense to look into the rough groups with words of similar meanings. Grouping large amounts of words requires a specialized process, with methods borrowed from semiotics or artificial intelligence tools. In this study, the groupings of words were conducted in a manner without the limitation of time. First, the words were categorized into norms, adjectives, and combinations. When the words were a noun, the singular and plural forms were put together, such as in “part” and “parts”. Afterwards, similar words were grouped together by use of a synonym dictionary. In addition, umbrella terms were grouped together such as in “season” for winter, autumn, summer and spring. The nouns that remained are “season”, “motif”, “climate”, “human influence”, “part”, “forest”, “tree” and “landscape”. As for the adjectives, the term was largely categorized into groups of “positive” versus “negative”. In addition to these two polar terms, several other adjectives were grouped into the three top frequent adjectives of “lonely”, “scientific”, and “natural”. During the presentations at a colloquium in Freiburg, it was suggested that the technique of stacking umbrella terms required more sophisticated elaboration from linguistics methodology. The term “red” may not correctly come under the term “color”, but be more appropriately categorized under "autumn," if we carefully analyze the wordings. Yet, due to the limited time frame of the research, issues on the sophistication of stacking words will be attributed towards the list of future tasks. The nature of this research was to provide materials for initiating discussions and the elaboration on the analysis of verbal data will remain as a future task to be addressed.

In summary, a rich collection of data was collected through conducted interviews for further collaboration. In addition, it became clear that more sophisticated methodology

for stacking over 400 words was required. Having said this, the verbal data showed insightful character into the public perception of forests. The frequently expressed "landscape" and high variety in the use of the term "human" with other words showed connotations for forestry science, in how the public perceives the human-nature interaction.

4.3.4 Results from rough sets theory

Using rough sets theory, an attempt to form grouping rules with the reasoning words was made. In this process, the number of words had to be drastically reduced (over 400 to 13) as previously mentioned in section 4.3.3. Even after this process, no clear rules were found that could be applied in general preference, regardless of interviewee profile data. Apart from the data size, the degrees of freedom in the wording seem to have been too large. Having said this, the rich wordings that interviewees assigned to the groupings were a good first step in exploring and examining the criteria and categories of forest aesthetics. There was still room remaining for exploring public attitudes toward forest aesthetics. Possibilities for further studies are elucidated in the following section.

Some examples of rough sets rules that were found in this analysis are given below. The image is provided after the rules, according to the number in the following texts (see figures 20, 21, 22 and 23 for images 26, 35, 1 and 2; other images are in the previous section).

Rule 1: If the term relating to "motif" was given and images 3 and 4 were grouped together — then it was female with 100% confidence with seven cases of supported examples. The strength of the rule (number of positive supported examples divided by number of examples in the described set) is 30.43% in overall female sets.

Rule 2: If the term relating to "landscape" was given and images 3 and 4 were grouped together — then it was female with 100% confidence with six cases of supported examples. The strength of the rule is 26.09% in overall female sets.

Rule 3: If images 11 and 20 and 3 and 4 were grouped together — then it was female with 100% confidence with nine cases of supported examples. The strength of the rule is 39.13% in overall female sets.

Rule 4: If the term relating to "motif" and "climate" was given and images 1, 2, 3 and 4 were grouped together — then it was male with 100% confidence with 11 cases of supported examples. The strength of the rule is 39.29% in overall male sets.

Rule 5: If the term relating to "human influence" was given and images 3, 4, 29 and 35 were grouped together — then it was male with 100% confidence with seven cases of supported examples. The strength of the rule is 25% in overall male sets.

Rule 6: If the term relating to "positive", "season" and "forest" were given and images 23 and 25 were grouped together — then it was male 100% confidence with seven cases of supported examples. The strength of the rule is 25% in overall male sets.

Figure 20: Prize winning photo from the Pefi photo contest (image 29). Photographed by Waltraud Butzler at Gunzenhausen (D), awarded July/August 2001.

Figure 21: First prize winning photo from the Pefi photo contest (image 35). Photographed by Rosmarie Ruckstuhl at Wohlen, awarded September 2001.

Figure 22: "Ohne Title (No title)", first prize from the contest "La Forêt/Der Wald" (image 1). Photographed by Walter Zbinden, who permitted this reproduction.

Figure 23: "Ohne Title (No title)", first prize from the contest "La Forêt/Der Wald" (image 2). Photographed by Walter Zbinden, who permitted this reproduction.

It was fairly difficult to draw meaningful results from these rough sets rules. Due to time constraints, the rough sets theory was applied mainly to explore gender differences. It was presumed that the differences from gender would be clearer. The intuition of the interviewer was that "season" related words were expressed more frequently by female than by male interviewees. This phenomenon was not proven to be statistically significant due to the limited number of conducted interviews. This is not to say that the difference did not exist, as about 72% males mentioned the related terms, whereas the figure was 84% for females. Further interviews are required to examine the results more clearly. Given that the insignificant word differences were inherent in the wordings, the rough sets rules with different image sets were not as clear as expected.

The promising feature from observing the group is that the groups were frequently reproduced, enabling future research to handle the frequent sets of certain pictures as contemporary "icons". If the trends continue in the case of other societies, the describing words and criteria need not to be given by the same interviewees, who have grouped them. The description of potential future research will continue in the following section.

4.4 Familiarity of Pictures

4.4.1 Sense of place: where did the interviewees feel the place was?

The familiarity question of the pictures revealed that interviewees had a very vague sense of where the pictures were taken. The interviewees usually split the group into the familiar and exotic groups. Therefore, the expressed terms were often referring to each group of the familiar or the exotic group, and not a general overall description. About one fifth of interviewees (10 people) did not express their opinion. As to the question of where the pictures were taken, Europe and North America were the typical answers. The term "Europe" was by far the most frequently occurring answer,

appearing 33 times in total. Interestingly, the United States of America was the most frequently expressed in terms of a single country. This term included "North America" (14 times), "USA" (7 times), and "America" (6 times). Canada was referred to three times. Probably due to the location of the interview and the large number of Austrian participants, "Austria" ranked high, having been expressed 16 times. Northern areas and the northern hemisphere were mentioned twice. A couple of countries were mentioned which interviewees indicated was certainly not the place where the pictures were taken. These were "not Latin America or Africa", "not Northern Europe or Finland", "not Slovakia" or "not Europe", each appearing once. In general, participants were nationals from these areas, tending to mention their home countries, state or regions. The actual places where most of the photos were taken were mentioned relatively few times, with Germany twice and Switzerland once. These frequencies were less than Japan (3 times) or Finland (3 times).

Sometimes the question became a sensitive issue that interviewees were afraid to give "wrong" answers. The interviewees often misunderstood and assumed that there was a right answer for the questions asked, and were afraid to comment on them. The interviewer had to explain and re-assure them that the interest lay in their feeling and perceptions, and were not based on scientific deductions from the taints in the pictures. Other reactions of the interviewees were encouraging and of high interest. An English lady mentioned that a certain image was from England, due to the cloud shapes, which were seldom seen in Austria. These remarks were related to the tendency of mentioning one's homeland when expressing where the interviewees thought the places were.

In summary, the sense of place that participants had from the images was rather vague, as mentioned from the beginning. A couple of scientists from IIASA attempted to estimate the places from scientific factors such as vegetation, climate and other geographical characteristics. Yet the majority of the interviewees answered the questions based on their own memories and intuitions. The above remarks from the English lady highlight this point. Therefore, the initial purpose of exploring the socially shared memories was accomplished. On the other hand, the questions posed were relatively loose and informally structured so that the interviewees tended to answer the question rather vaguely. There is a need to refocus each question to attain more specific answers. The question should be improved by collecting the clues that the participant based their guesses and estimations on, such as clouds, climate, trees, vegetation, or atmosphere. The data from interviews will become clear when we ask more specific question regarding what components influence the judgment of place. Besides, the interviewees need to be reassured in the beginning that the purpose of the interview is not to induce a certain place or country based on strict scientific knowledge or clues. The fact that there is no right or wrong answer for this question needs to be made clear at the beginning of the interview, so that the participants feel encouraged to answer the questions based on their own memories and experiences.

4.4.2 Results from image groupings

The picture that was most often indicated as conveying "familiar" and "foreign" feelings was determined. The frequency was not as high as supporting cases in groupings, because interviewees were not asked the specific question. A significant

phenomenon was the skewed distribution of photo contest sources labeled as "exotic". The top ten images that were frequently categorized as "exotic" originated from the "La Forêt/Der Wald". There are several potential explanations for this occurrence. The obvious explanation is that the "La Forêt/Der Wald" was the only photo contest with black and white images. In addition, the only pair of images originating from a non-European country (Taiwan) was included in the material from that particular contest. The images that conveyed a foreign feeling were the pictures that were taken in Taiwan, a non-European country. The images from Taiwan ranked first and third appearing 14 and 10 times, respectively. The second place in between these images was one of the black and white images (image 3 in section 4.3.4), which was mentioned 12 times. A separate calculation was conducted, applied only to the results for Austrian interviewees. The top four exotic images were all black and white ones (mentioned 6, 5, 5 and 4 times) from "La Forêt/Der Wald", followed by the images from Taiwan (3 times each). The difference may have been accidental and an explanation for this occurrence is difficult due to the limited data of 20 subjects. Even the most frequent image considered to be exotic was grouped only six times. Whether there is a country specific trend needs to be reexamined more carefully with a larger data set. There were three images that were never mentioned as being exotic, which included both of the images that were most frequently grouped together. This image with light penetrating into the dark forest did not rank very high in "familiar" ranking (images 6 and 9 with a frequency of 9 and 8, respectively), it is worth commenting that the "most frequently grouped set of images were the ones that were never mentioned as being exotic (but not necessarily most familiar)".

As for the most familiar images, there were two top images with a frequency of 12 times, slightly less frequent than the top exotic image. The first picture was highly remarkable, as the picture was awarded a special prize "Pro Silva Friburgense (Latin: Close to Freiburg)" in the contest "La Forêt/Der Wald", that was taken in the neighborhood of the hosting organizations in Switzerland (see Figure 24, image 9). The picture that was supposed to indicate the locality of a specific region conveyed the feeling of familiarity to the interviewees on a universal basis. The other image that was frequently grouped as a familiar image was image 29 in section 4.3.4. As for the Austrian specific case, different images with red autumn leaves were determined to be most familiar with a frequency of seven times. Again, the explanation requires further data collection from Austrian interviewees. Interesting remarks were given from an American lady, when the familiarity questions were raised. As explaining her most familiar picture with image 29 (see section 4.3.4), she added that *"this picture is most familiar with agricultural landscape. But it is not my favorite"*. This indicates that "familiar" is not always associated with "home" or "attachment".

Figure 24: "Parures d'autumne" special prize Pro Silva Friburgense. Photographed by Paul Schillinger, who permitted this reproduction.

Critical comments pertaining to the wording of the questions will be addressed here. Whether the words, "familiar" and "exotic" were the most appropriate terminology for exploring human sentiment was questioned during a presentation in Freiburg. It is necessarily true that wordings are critical to questioning interview subjects. Whether people interpreted "familiar" to be equivalent to "at home" or "attachment" was questionable, clearly from the example above. As we have discussed in the 3.2.3, this issue is a central question to the discussions concerning the term "place". Reflecting the discussions from Lipovac (1997), the author argues that "familiarity" is still one of the best candidate words for asking for public perception on "places". On the other hand, the question addressing what is not "familiar" needs more sophistication. In this study, the question was usually in a wording of "which picture is not familiar, the opposite from familiar, exotic and foreign ones?" Some interviewees were confused with what "not familiar" meant. There is a need to improve the exact wording or phrasing of the question from these previous interview experiences. The advantage is that some relevance may be found between the familiarity question and results from the grouping exercise. The most frequently grouped sets of images in the latter turned out to be the ones that no interviewees mentioned as being "not familiar" or "exotic". The connection is not causal but indicates a relationship, which may be a promising sign.

In conclusion, asking the familiarity question allowed the interviewer to collect sufficient data to attain a better understanding of what type of images are frequently mentioned as "familiar" and a couple of indications of what these feelings are based on. An image for evoking a "locality" symbol winning special prize for a certain area had collected most frequent expressions for familiarity from interviewees. Moreover, a link between frequently grouped images and the "familiarity" question was found and is an encouraging sign for further research. Wordings and specific terminology for asking these issues require further elaboration. Directly asking the interviewees about the term "familiar" should be compared with other types of wordings and methods of questioning. However, the purpose of providing data for initiating a discussion on this

subject area was fulfilled, opening new dimensions of questions in which more precise wording and questionnaire structure will need to be addressed.

5 New Tasks

There are five new tasks suggested here for further research in the future. All of them are already discussed mostly in sections 3 or 4. The first future task is to compile larger data. Besides enlarging the interviewing database, there are three potential improvements that could be made to the current research framework. The second point concerns the eligibility of the grouping result. There is a critique that the interviewee may have not grouped the images in accordance with the research purpose. Another set of interviews need to be conducted with purposes and contexts given to the interviewees, and compared to the results from this paper. Thirdly, the reliability of the results needs to be strengthened by widening the scope of the interviewees. Interviews excluding scientific institutions need to be conducted, to explore wider social contexts, such as in parks, schools and in a family. The fourth point is related to improving the analysis of the grouping results. The last point is concerning the application of the results to wider contexts such as images used in arts, advertisements, brochures and other NGO campaigns.

As we have seen in all sections of the results, the first future task is to enlarge the data in order to see clear trends and statistical tests. In other words, there are obvious needs for continuing to conduct interviews and collecting a larger data set, in order to make statistically significant conclusions. The preferences from dead wood indicated several research potentials in the future, such as the correlation between education and preferences. This requires larger data in order to conduct meaningful logistic regression analysis. The grouping results were criticized that the data was so small (from a statistician point of view) that the frequency of supporting cases were not significant. Shortage of data has caused difficulties in most of the results sections.

Secondly, the question of whether interviewees grouped the images based on their experiences and memories was raised. The approach that this paper has adopted may initially seem crude, since no contexts are given for the interviewees to answer posed questions. Some experts pointed out that contexts might be given in order to collect meaningful data that could contribute to policy-making. In this paper, the author asserts that contexts need not be given in this study, since groupings are to be made based on individual experiences and memories. As a matter of fact, in actual conducted interviews, no interviewees rejected questions due to the absence of a given context. Nevertheless, it is an interesting suggestion to conduct interviews with contexts or purposes, by designating the framing of the groups including productions, recreational, or art, because it is an intervention that is omnipotent in existing forest preference enquiries. Comparing two results would certainly be insightful. The hypothesis of the author based on these experiences is that the results would not be heavily influenced, as long as the public is questioned without being given any specific knowledge on forestry beforehand.

Related to the question of giving contexts and purposes is the possibility of conducting interviews in non-academic institutions. The continued interviews in Germany and Switzerland will indeed be conducted outside the research institution environment and will be conducted in private homes. This was one criticized point in discussions outside of IIASA, such as in the German Forestry Economic Colloquium. Interviews outside of a setting in scientific institutions are necessary to validate the results in this paper. On the other hand, finding a cooperative group of people is not so easy as the nature of investigation requires devotion in time and labor for the interviewees.

Further suggestions to this study have been based on identifying the most strongly supported set of pictures. In the future, interviewees may also be asked their opinion on which picture in a certain group appears to be the strongest or most typical of the set. By asking this specific question, the picture that is thought of being the core of a certain group will be identified. This will also allow the examination of whether a strongly supported set of images is present or not. Apart from the strongly supported image sets, movements of other pictures surrounding these particular sets of images can be analyzed in future studies. The question being raised relates to the kind of images that are closely associated, which constitute a strongly supported set of pictures. Future research plans include treating the strongly supported unit as a single set of images and determining what kind of interactions are happening with other images. Last but not least, it is hoped that the identified highly supported set of images can be linked to images in other forms of media, such as in advertisements and the arts.

Finally, it is the ultimate goal of this paper to find the link of the strongly supported sets of images to images in other media, such as in advertisements and arts. The largest discussions at IIASA with respect to this study can be summarized in one question: "How are the results going to contribute to policy making?" Since the purpose of this research was to provide material for initiating discussions on forest aesthetics that are not pre-screened by scientific dichotomies, contributions to policy making do not fall in the direct scope of this paper. Nevertheless, as we have seen in previous discussions of "place-space" or "sense of place" in terms of the familiarity question, these issues are increasingly gaining attention in policy-making, in practice. The aim of this research is to attain a better understanding of motifs, schema, and keywords saved in the shared memory of contemporary society, which constitutes as one of the direct ways in which this work can contribute to "place" related discussions.

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