The Spatial Structure of The Landscape as One of the Elements of the Landscape Identity

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Abstract. The landscape identity is a holistic concept and includes many aspects of equal importance. Studies of the landscape identity often reflect local-scale aspects of the landscape identity; this is due to the emphasis and exploration of cultural and historical landscapes – through researching of a traditional management, traditional technology, the usage of local materials and local traditions. On a local scale, there are individual details, events, and people. The visual analysis and methods developed on its basis are mostly used in the studies of landscape identity. The architectural science recognizes the power of visual message which should be a planned and strategically guided aspect, as it has a significant impact on the forming of an overall image of the urban environment, as a visual message is a source of information and a topical issue in the context of the urban landscape. One of the characteristics of the visual aspects is the spatial structure formed by the building volume, the terrain, and the groups of woody plants, the planes formed by pavements, streets, meadows and fields, the water surface. Landscape identity is also based on the cognitive landscape research. The study of the interaction between identity and geographical environment provides an answer to how the transition from physical to socially cognitive identity occurs. Equally important is the group of cultural historical aspects of the landscape, based on multiple studies of the history of a particular place – from the beginnings of landscape formation, where morphological and climatic factors play an important role, to human made elements, where changes in the landscape structure and individual landscape elements are as a result of human economic activity that reflects the political, social and economic situation of the country. In the landscape planning process, the concept of the landscape identity is used to reinforce the character, distinction and specificity of each populated place or rural landscape, which is essential to preserve in creating structures and objects of a new landscape. The purpose of this article is to analyze the role of a spatial structure in the overall image of the landscape identity, as well as the subconscious, cognitive aspects that people think of landscape identity by common spatial structure, abstracting, smoothing out details, and giving symbolic meaning. The article summarizes the spatial structures of different landscapes, analyzes their diversity in both rural and urban environments, classifying them into types and subtypes. The article develops various spatial models and analyzes the cognitive perception of people using the survey capabilities. As a result, there are defined the role of the spatial structure in the comprehension of the landscape identity and recommendations for the inclusion and preservation of important spatial structures and elements in the planning process.

1. Introduction
Understanding of the concept of identity works more on the subconscious and mind level and is less connected to sense organs. The concept of the identity is related to a person's desire to know and
understand himself. Today, the concept has a much broader meaning and several levels of perception, starting with the identity of the individual to the national identity of all the country in general. In Latvia, the issue of the identity was raised in the 1980s, 1990s and before joining the European Union, and in general, it is related to the fear of losing one's existence – traditions, culture, environment, habits, etc. [1-4].

The landscape has a holism (comprehensive nature) that prevents one from unambiguously confirming one of the theories of landscape research or modelling if it does not take a multidisciplinary approach. So understanding begins with the concept of the landscape, the relationships and interactions that exist in the landscape, and only then the analysis of the individual components of the landscape. [5-7]. In general, the landscape is still a dualistically perceptible totality. First of all, it is the visible surroundings that a man basically captures visually. Secondly, it is a whole ecological system that has been formed in a long period of time by the influence of nature and human. Therefore, the perception and exploration of the landscape can be based on these principles.

Similarly, the landscape is endlessly varied and diverse; it is mainly formed upon the influence of socio-economic, political, technological, natural and cultural conditions. In each landscape, these influencing circumstances are in a special interaction, at different levels and at different times, acting on them with different forces. Some of these conditions may be primary, some secondary to the particular landscape, some may be as the consequence, or vice versa, as a reason created by the result of the effects of other conditions and their combination. The landscape changes not only upon the result of human influence, but it also has its own inner variability. There are not two identical landscapes all over the world; each is different on its own, in time-cut and in a perceptive section [8-10].

In landscape studies, the issue of exploring certain landscape elements is topical. James LaGro, Professor of Landscape Architecture (James A. LaGro) [11] divides landscape elements into three groups, two of which are related to natural formations – physical geographical attributes and biological attributes, and one group is the attributes created as a result of human activity – cultural attributes.

Physical geographical attributes combine groups and processes of several elements: climate and climatic zones, features of the geological structure, terrain and its forms, soils and their types, water resources – seas, rivers, lakes, swamps, natural disasters – storms, floods, etc. Looking at the landscape at the highest level of perception – as the whole continent or part of the continent, this group will have major importance and play a determining role, since we describe this perception scale only as a physical geographic complex and human activity has no longer so determining role. On analyzing close scale landscapes, for example, separate views or small areas – this group has basely the background role, except in cases when the shape of the terrain or water objects is visually prominent, for example, a waterfall or a rock in a single view will be as a dominant element. Physical geographical elements are the most stable of the changing landscape structure [12]. Biological attributes, with their continued variability both at the turn of the seasons and in the development stages of their lives and through the influence of other elements and natural processes, combine both human society and the whole plant and animal society, which is combined into individual and diverse ecological societies – habitats, areas, etc. The role of biological elements in a large-scale landscape is divided, as it is determinative in the role of individual groups, while the role of an individual plant or animal in forming of the identity of the landscape is less. The vice versa situation is on a close perception scale where an individual tree can play a determinative role, while a large plant mass plays only a background role [12]. The group of cultural attributes is the most versatile because it combines all human activities reflected in the landscape: land usage and regulation (agriculture, forestry, etc.), land properties and administrative distribution (districts, municipalities, cities, etc.), protective measures, buildings and infrastructure, cultural and historical objects, human needs, etc. On a close scale of perception, a person and his activity have mostly a determining role, on increasing the scale of
perception the role of cultural elements in forming the identity of the landscape reduces, moving from individual buildings to the urban scale [11].

It is exactly perception that has great importance for explaining the concept of the landscape that is also highlighted in the definition of the landscape given in the Landscape Convention. Different levels of perception play one of the roles in explaining the concept of the landscape. The perception of the landscape is closely associated with the sensory organs – hearing, sense of smell, tactile, taste and vision. Landscape perception is mostly impacted by vision, hearing and taste [12]. Human perception does not only end with the sensory organs – it is more versatile and also linked to mind, consciousness and memory. Often we only need vision and mind in the sense of the landscape. Vision, in combination with mind and memory, provides us with information that other sensory organs could provide – because when you see the object, colour, shape and texture that we've ever felt, the memory provides us with information related to the scent, sounds, and feelings of touch of this landscape [8, 12-16].

Landscape variability is not only associated with the physical changes of the landscape, but often with the different understanding and perceptions of the landscape – on the one hand, the landscape is an objective reality – it is the physical part of the landscape, which is a natural and human-made object; on the other hand, the landscape is associated with human subjective perception and through symbols, memories, emotions and feelings, every person sees the landscape differently. One should agree with the words of the geographer Rihard Muir that every landscape is made up not only of what is before our eyes, but also of what is in our heads [10, 17, 18].

The concept of the landscape identity and the model of the landscape identity were reflected in the work by Derk Stobbelars and Bas Pedroli, referring to the concept of the landscape defined in the European Landscape Convention and other European documents. Scientists note an ambiguous concept and understanding of both the landscape and the identity that influences the concept of the landscape identity in general. In the end, the authors define the identity of the landscape as the uniqueness of the area through physical, social aspects reflected in a spatial cultural and historical environment. To explain the versatile nature of the landscape identity, they developed a circle of the landscape identity that includes several aspects that affect the perception, understanding and usage of the landscape identity. In particular, the authors note that the identity of the landscape hides in the totality of individual and social aspects that reflect the interaction between spatial and social elements. These aspects are divided into three groups: the physical nature of the landscape, the social and cultural historical aspect. The circle of the landscape identity explains that the identity of the landscape is not just a reflection of related areas, but also how the landscape is perceived and understood, as well as also represented. The authors acknowledge that the circle of the landscape identity does not always fit absolutely for all cases, because the landscape identity can be observed on different scales, both regional and local, as well as there could be different research objectives and settings focusing on specific aspects [19].

The landscape is as a reflection of a regional context through architecture, culture and basis of nature. Many elements of the landscape are easily perceptible and associated with a particular area – usually, these are expressed shapes of terrain, large buildings – in general, creating a clear structure and shape of the landscape, but the landscape elements of some places are less pronounced; and here the identity and feelings of the site are more expressed through emotion and nuances, which are often more cognitive and incomprehensible parts of the landscape [8]. For example, on mentioning the sea bluff – for most people, it's their own particular place with a specific name – there an abstraction of perception is formed.

The identity of the landscape is to be characterised and defined separately for each scale. The scale of the landscape and the scale of perception must be understood separately. Each scale of the landscape
perception is marked by a group of landscape elements that influence the structure, perception and development of the landscape itself. As the scale of perception changes, the number of visible parts and elements highlighting the identity of the landscape changes [20]. In a theoretical study, the perception scale can be divided into three groups — close, medium and large [21]. Each scale of the landscape perception is marked by a group of landscape elements that influences the structure, perception and development of the landscape itself. In each level (scale) of the structure, there are its legal relationships, its forms of expression of legality, and its possibilities to study them and use the results of the studies. The main condition for scientific research and design works is based on the rule: legal relationships corresponding to one level should not be automatically transferred to another level [22]. A close scale is more easily perceived to a man, as well as an average, which is more easily associated with specific places, feelings, emotions, memories and where details are easier to see.

It can be concluded here that perception, scale and spatial structure has a major importance in forming the identity of the landscape, where they are intertwined with cognitive perceptions – the perception, emotion, memory, symbols of each individual. One of the tasks of this article for the author is to understand if the spatial structure isn’t one of the factors creating the landscape identity directly when even without detailed elaboration and specific elements; the landscape takes its characteristic form – the basis and shape of its identity.

2. Method and object
In order to understand the role of spatial structure in the landscape identity, two paths of research have been chosen, one of them is a practical path that helps to go deeper into cognitive perception directly, and the other path is methodological, which opens up the possibility of structuring different landscape spatial models.

2.1. Typology of the landscape spatial structure
This is a theoretical approach aimed at distinguishing between spatially different landscapes groups, where the characteristics of each group are the part of a common description of the identity of the landscape. In order to create a typology for the spatial structure of the landscape identity, it is important to understand at which scale it is intended to be used. For the purpose of the study, the close or the medium scale is important, which basically describes one landscape space. Here, the typology is based on criteria recommended by several authors to be used in landscape research and which describe the spatial structure directly. As the final result, the typology matrix of the spatial structure of the landscape is prepared.

2.2. Modelling and survey
5 different landscape photos from the author’s archive have been selected – all of which are real landscapes that describe the landscapes of different European countries. Three urban landscapes and two rural landscapes have been selected. There were made abstract 3D models from these images on using the modelling application – SketchUp: 3D Design Software. Models are designed without details and small-scale elements, without natural colours and textures that could influence respondents. Only the abstract spatial structure is important, where one of the forming factors is the scale of the landscape space, plant cover – vegetation, construction volumes, the basis of nature and terrain. Models are gathered into a survey offered to different respondents. It is allowed to express one’s opinion on each image in free form, allowing describing one’s emotions, memories, and describing this landscape. The results of the survey are collected and analyzed for each image, looking for similar and different feelings and characteristics.

To summarize the respondent responses, response groups are composed for each image which matched by mood, emotions, and other cognitive aspects (childhood memories, specific places, actions, activities). The most common responses are collected for each image by pooling them into
groups: emotions, elements, scale, and perception of a spatial structure. These groups also match with the typology criteria for the spatial structure of the landscape, adding an emotional characterization. All responses are summarized and response groups are compared by using a percentage distribution of responses. Survey results are presented in graphics and diagrams.

3. Results and discussions

3.1. The typology matrix of the landscape spatial structure
The visual analysis and methods formed on its basis are mostly used in the landscape studies. The power of a visual message is recognised in architectural science that would be a planned and strategically driven aspect, as it has a significant impact on the formation of the common image of the urban environment since the visual message is a source of information and is a topical issue in the context of the urban landscape [23]. Visual landscape analysis uses many characterising criteria and also describes individual landscape elements or their groups. Not all criteria can be used absolutely or all landscape elements can be characterized in all cases, so “rating filters” are used. These filters should be adapted in cases for specific landscape or depending on the specific nature of projects where visual landscape characterisation is required – a clear theoretical basis, the possibility of adapting and transforming results, numerical values of indicators, the possibility of mapping landscapes, transparency and repeatability [24].

The most commonly used criteria for characterization are the following:
- Characterizing elements of visual accessibility – view location, the length of the view line and view width;
- The scale of the landscape. In each of the perceptions scale, there are its legal relationships, its forms of expression of legality, and its possibilities for studying them and use the results of studies [21, 25]. As the scale of perception changes, the number of visible parts and elements highlighting the identity of the landscape changes [20];
- Colour, texture and materials occurring in the landscape. These criteria regarding the human-made elements mostly reflect expressions of traditions in the landscape and are physical manifestations of aesthetics [26];
- Emotional factor of the overall image – feelings that can range from boring and insecure to inspiring [10];
- Diversity, uniqueness and rarity of the landscape. Landscape diversity is often emphasized as an indicator of visual quality [26, 27]. Diversity is divided into two groups – diversity of structures and diversity of landscape elements [28]. Most often people perceive the diversity of elements, but often the landscape is homogenous in its origin, therefore the structural diversity and biodiversity are also revealed;
- Naturalness and the way of land usage – three sub-groups can be identified here – a little-affected landscape, a partly exploited landscape, an intensely exploited landscape. The specificity of land usage is closely linked to terrain shapes [27, 29].

The most commonly used characteristics of the landscape and their groups are the following:
- Terrain shapes which directly affect views and visibility and landscape diversity [12, 30]. The link to visual sensing features is created here which describes the specific nature of the spatial environment [12]. For example, landscape types of the local scale typical for Latvia – flat agricultural lands, flat forest lands, flat forest landscape, wavy agricultural lands, wavy forest lands, wavy forest landscape, hilly agricultural lands, hilly forest lands, hilly tile-shaped landscape, as well as unique landscapes – lake landscapes, landscapes of terraced river valleys, river landscapes, wetland landscapes, swamp landscapes [21, 28];
- The nature, intensity and styling of the building define the cultural and historical core of the landscape identity which reflects human activity in a particular landscape area. The building is
characterised not only as individual architectural elements and their groups, but also as the structure of the landscape [31];

- The individual architectural elements can be both of functional load and of symbolic and aesthetic nature. Symbolic elements are often the key to the landscape identity, which works mostly at both visual and cognitive levels;
- Roads in the landscape are defined as a row of viewpoints. The nature and surface of the road clearly defines its congestion and frequency of usage;
- The ground surface is a landscape background that can be typical for a particular landscape area or unique. The type of the ground surface gives information on the type of usage of the area, which is also one of the landscape-characterised sizes [27, 29]. The historical or traditional usage of the territory is also included here looking for links with today’s;
- The flora that forms the plant cover of the earth is one of the elements of the landscape that have a pronounced seasonality, so its assessment depends on the seasons. Plants are as indicators indicating the naturalness of the landscape, climatic conditions, and the traditions of a particular area and the structure of the landscape;
- Water elements in the landscape are most commonly a factor of diversity that attracts not only the plant and animal community but also human attention and desire to be next to the water.

The American Landscape Management Department developed a method of valuation of the landscape visual resources that allows the following criteria — terrain shapes, vegetation, water elements, colour, and impact of adjacent areas, rarity, cultural and historical objects. This method is also widely used for the visual assessment of the landscape today, both in Europe and in America [33-36]. Visual value is also highlighted in inventory works of the landscape where landscape quality - landscape unity, diversity and aura; view ability and accessibility are as key indicators [32].

In general, the landscape structure is assessed by multi-dimensional criteria that reveal landscapes, both spatial and scale, and colour and texture palette, both the emotional side of the landscape, and natural factors, the existence of cultural and historical objects, vegetation, building, etc. On combining the information obtained a number of criteria groups crystallises which have a direct impact on the spatial structure, abstracting from fine details to the simplified spatial model. In the table, they are ranked according to the author's view for they can be seen sequentially, but it must be acknowledged that, in certain cases, when there is an excellent and large-scale dominant in the landscape, the perception of the spatial criteria is ranked even in reverse order. It is important to identify all these groups of criteria, which are often linked to each other. For example, terrain influences the parameters of the view, but the terrain is able to highlight one of the elements as a dominant, as well as scale impact on characteristics of perception.

| Table 1. Groups of criteria forming the spatial structure of the landscape |
|---------------------------------------------------------------|
| **Group of criteria** | **Possible division or groups characterisation** |
| Landscape type by type of use | Rural landscape, landscape of suburbia, urban landscape |
| Landscape space scale | Medium, close, intimate |
| Construction of the spatial structure of the landscape | Simple, monotonous, rhythmical, complex, etc. |
| Landscape terrain | Flat, wavy, hilly, gorges, stoops, etc. |
| View parameters | Open, restricted, narrow, etc. |
| Elements and their groups | Nature elements and human-made elements, dominants, composition of elements, etc. |

3.2. Modelling and survey results.

There were 5 images used in the survey (Figure 1), modelled as simplified images, without colour and texture. The survey is offered to respondents in electronic format with the invitation to share in writing
about emotions and thoughts that respondents will think about this type of landscape, memory, or feelings. 84 respondents participated in the survey.

**Figure 1.** Modelling process

The analysis of each spatial model provided an understanding of the complexity of the spatial structure and its recognition, as well as a link between spatial structure itself and emotions, their regularities. Different landscape spaces created different emotions, feelings and memories, as well as they were perceived spatially differently, creating a direct link between the spatial structure and the perception of the landscape as well as the formation of the landscape space identity.

**Spatial model 1** – wide view with dominant – church tower. Spatially, all respondents recognized this landscape as wide, with open views, traditional landscape. This simplified spatial structure was readable unerringly.

The distribution of respondents' emotions, memories and personal stories were interesting. The emotional distribution of the respondents is divided into three groups, where most of the respondents (58%) found this landscape to be pleasant, bright, wide, harmonious, and full of hope. Some of the respondents see this landscape as gloomy, deserted, and lonely (23%), while the other respondents associate this landscape with childhood, relatives and family (19%) (Figure 2).

**Spatial model 2** – wide views along the sea – partly open landscape. Spatially, not all the respondents recognized the seashore directly, and there were also responses about the bank of a river or lake. This relatively simple spatial structure without dominant and recognizable spatial objects was readable already differently.
The distribution of respondents' emotions is divided into several groups, sometimes even with conflicting feelings. The vast majority of respondents associate this landscape with peace, relaxation and meditation (45%), as well as in common the entire positive, but active, broad, relaxed feelings were raised by this landscape for 40% of respondents. A small number associated this landscape with childhood memories or being alone with oneself (Figure 3).

*Spatial model 3* – a small, intimate-scale landscape in the park, with closed views and thick vegetation. Spatially plain landscape, which was recognized relatively easily by respondents, thoughts shared on whether this was an urban landscape or a forest landscape.

Respondents' feelings ranged from unsafe and agitating (26%) to pleasant and peaceful (33%), but the vast majority of respondents felt here intrigue and mystery, a desire to see what lies next. But part of the respondents (11%) thinks this landscape is relatively impersonal and uninteresting. Individual respondents pictured bird songs, bugs or dating friends, as well as the desire for walks (Figure 4).

*Spatial model 4* – modern residential buildings, with limited views, dominants of the active construction volume and plants in the foreground. The relatively complex spatial structure – both complex building and different scales, as well as a number of elements, viewing opportunities, near
view plan, depth plan, etc. This spatial model was already more difficult for respondents to define more precisely and to define their uniform attitude.

Also, emotions and feelings are more layered, multiform and complicated, divided into several groups. A larger part of respondents found this landscape depressing (32%) and, on the contrary, the other part – dynamic, enjoyable and modern (28%). Relatively many respondents felt unsafe, observed by others (9%), but some believed that there was nothing to do with this place, that it was typical and not particularly interesting (15%). Many respondents had already a specific association with the site (17%). (Figure 5)

Spatial model 5 – industrial heritage, historic landscape space, complex spatial structures, with a water channel, many buildings but without vegetation. Spatially, this landscape was easily recognizable through the little detailed elaboration of the model, which yawned on recognizing the historical environment, which allowed recognizing the historical environment, which was perhaps the redundant detail. But rarely any respondent recognized exactly the industrial landscape.

A larger part of respondents sensed a feeling of a depressing, insecure and limited space (42%), while some respondents associate historical landscape with trips and adventures (31%). Several respondents called associations of quite specific places (19%), but only a small part thought this was a pleasant, harmonious environment (8%). (Figure 6)

The results of the survey of respondents, on assessing the spatial structure of the five different landscape spaces, are assessed in two directions: whether visual-spatial code of the landscape can be read, the function of the landscape can be understood, and the second, whether emotion, feelings, and memories can be attributed to this impersonal and black-and-white model. It should be admitted that the recognition of the spatial structure of the landscape, as well as the recognition of a functional load, depended on the spatial complexity of the landscape – spatially simple landscapes are recognized unerringly, but relatively complex landscape spaces have already produced different views. For example, the rural landscape space with the dominant of the church cast no doubt, but the recognition of the seaside and the park was quite complicated. But recognition of the urban environment produced the most versatile answers, where often even half of the answers don't match the truth. For example, only a few respondents recognized the landscape space of an industrial heritage.

Diverse feelings and memories of respondents demonstrate the purpose of this article – spatial structure, even in abstract ways, can produce very specific emotions and feelings, even memories, because our subconscious, at an abstract level, gives spatial structures the specific emotional nature and even forms links to our memories. We are able to create a whole story only from the black-and-white spatial model of the landscape. It is important to note that these emotions are not the same for respondents, not even similar, sometimes even contradictory, which, once again, proves the differences of cognitive level of the individual, even in the valuation of such impersonal spatial model of the landscape. The purpose of this article is not to analyze the distinct cognitive perception of each of the landscape spaces, but to prove that the role of the spatial structure in creating the identity of the landscape is much more extensive than creating a visual image.

4. Conclusions
On performing both the typological distribution of the landscape spatial structure and the respondents' surveys, a number of opinions have highlighted concerning the formation of the landscape identity and the relationship with the spatial structure. In relation to the previous landscape identity studies in my works, I have suggested the idea that the identity is composed of three creator factors – cultural and historical development, visual structure and cognitive aspects. It is clear that in general in such a way remains a stable forming structure of the landscape identity – without excluding any of the creating
factors. But interesting is the process by itself that we are able to give the shape of an already specific area to the abstract spatial images. Here comes the symbolic part of our thinking, which really excludes details and lifts already prepared images from the subconscious, with a pronounced emotional shade. Respondents were able to share all kinds of emotions only on a black-and-white image that has no link to a particular place, no colours, any sounds, or smells. A direct link between the symbolic images of a spatial structure and the emotions of people, coded in a subconscious mind for each of his personal experiences, is forming here. On the one hand, this phenomenon reflects our experience in the landscape and everyday life, but on the other, it often simplifies our perceptions by preventing us from enjoying the landscape or seeing important details.

Thus, the spatial structure of the landscape itself is able to create not only visual image, but also directly affects cognitive perception by connecting the subconscious images of individual, clichés, memories, associations and other aspects of cognitive perception. These conclusions after managing a survey call for a review of the role of a spatial structure in the creating process of the landscape identity and give it not only composites – visual significance but also emotional significance.

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