

# Iterative Digital Photo-based Assessment for Rural Landscape Perception: A Small Experiment from County Wicklow, Ireland

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**Abstract:** Photography – a simulation of the landscape – is often used to assess visual qualities of landscapes, silently implying there is consensus around what remains the best representation of a given landscape. In this study we examine if such a consensus in visually experiencing a landscape truly exists and what the main differences in visual perceptions of landscape are. To gather participant's visual experiences, a participant generated image (PGI) method was used. Each participant took a photo, which he/she believed best represented the surrounding landscape and provided reasoning for their choice. With a combination of qualitative and quantitative analysis three distinct perceptions were found. Each places different emphasis on land uses, locality and the concept of nature. The study shows the plurality of visual experiences of a landscape, suggesting caution when using surrogates for representing a landscape and offers alternative possible applications of the PGI method for evoking and understanding people's views of landscape.

**Keywords:** Participant generated image, visual landscape assessment, photographic simulation, landscape perception, landscape experience

## 1 Introduction

The European Landscape Convention (ELC) defines landscape as an area “perceived by people...” (COUNCIL OF EUROPE 2000). During the late 1960's through to the '70s, there was an emphasis in landscape assessment towards quantitative methods of attaching a numerical value for the 'subjective' responses to aesthetic or scenic quality. In terms of landscape visual assessment, geography – especially in North America after the 80s – moved from the measurable parameters of linear perspective, towards the interaction between the observer and the observed area (COSGROVE 1985). In this postmodern spirit, there might be multiple preference views for the same physical landscape. Although ELC offers a democratic definition, it raises a problem already shown by MEINIG in 1979 (p. 1): “even though we gather together and look in the same direction at the same instant, we will not – we cannot – see the same landscape.” This controversy is even more evident across rural landscape perception, whose meanings and perceptions are generally romanticized or fictionalized (HULL & REVELL 1989). As perception is influenced by people's identities, social and cultural backgrounds, intentions and motivations (SCOTT et al. 2009) investigating how we actually perceive a given landscape seem valuable in establishing a common ground on which to base further discussions, assessment methods, and policies about landscapes.

Photo-based assessment is generally accepted as a credible representation of landscape (DANIEL & MEITNER 2001), but requires appropriate sampling and analysis methods. Methods for selecting and presenting photos vary among specific applications. If the sample size is sufficient it is possible to use systematic random sampling, excluding the cases in which prominent landscape features are present. If scenes are selected on the basis of professional photographic criteria or if the evaluator selects representative scenes, substantial bias may be introduced. HULL & REVELL (1989) argue that photographic sampling of landscape should incorporate the general public's choices into sampling structures.

This demand should not be hard to achieve in an increasingly digitalized society, employing the ease of digital photography – potentially an abundant source of information. Besides the visual information, digital photographs include metadata such as focal length, GPS co-ordinates, time of photography etc. that can be analyzed with simple statistics. But while the acquisition of data can be achieved simply by means of mobile digital devices and social media, there seem to be a lack of agreed-upon methods for analyzing and meaningfully interpreting participant generated imagery (BALOMENOU & GARROD 2016).

There are a number of initiatives in achieving proper collective results in PGI assessment. The Scenic Beauty Estimation method (SBE) by DANIEL & BOSTER (1976) relies on three basic steps: 1. presenting landscape by photo-based slides; 2. presenting slides to observers; 3. evaluating observer judgments. In this research, we focus our attention in the gap between sampling and display methods (step 2 and 3), and so improve SBE stepped strategy in a feedback-looped protocol: 1. presenting landscape by individual photo-based choice; 2. description survey and questionnaire about the decisions implied in step 1; 3. collective display of results of step 1 and 2; 4. and finally collective evaluation of perceived sampling in 3. This looped strategy is closer to the idea of a self-regulated process – cybernetic – than conventional PGI assessment methodologies. The possibilities of digital technology are therefore potentially useful not only in coding the sources of information – digital photography metadata collection – but also endorsing and feeding the whole participation process.

## 2 Methods

This small experiment was conducted during a one-day field trip to County Wicklow, Ireland, within a COST RELY Training School, consisting of a week-long intensive workshop on the topic of visual impact of wind farms in the landscape. The participants were mainly foreign experts dealing with landscape (social scientists, engineers, ecologists, landscape architects, architects, planners etc.). The convenience of engaging such a multidisciplinary range of participants at the same time constituted a small, non-random sample. This issue is looked at further in the discussion section.

To gather participants' views of the landscape, the participant generated image (PGI) method was used. HULL & REVELL (1989) describe this method as a suitable way to collect information around how people perceive the landscape. PGI was originally devised in 1972, but received little attention (BALOMENOU & GARROD 2016, CHENOWETH 1984). Although used for many purposes ranging from psychology to landscape assessment in recent years, no general comprehensive theory on its use has been established (BALOMENOU & GARROD 2016). The original experiment, as described by CHENOWETH (1984), consisted of distributing cameras to hikers, asking them to photograph anything they wished and to write a short reasoning

for taking each photograph. The experiment presented in this paper largely followed this protocol, with some modifications as cited below.

The location of the experiment was a site for a possible windfarm in Wicklow. Practical reasons and landscape characteristics played a major role in deciding on the specific location. An open landscape on the border of a protected area was subsequently chosen. Participants were orally asked to take a single photo on site, which they believed best represented the landscape they were in. The vantage point was predetermined. Participants used their own cameras and were free to adjust the settings of their camera as they saw fit.

Only one photo per participant was allowed in order to force the participants to think about the landscape. Predetermining the vantage point further narrowed the range of possible views. As the number of participants was small, this also introduced certain control into the study.

The next day the participants were presented with a questionnaire aimed at discovering what the core reasoning for the photo they took (the narrative of the photo) was, whether they captured a scene they considered as everyday or unique, which camera settings they adjusted and if the context of the Training school (wind farm and visual impact) affected their choice of view. The answers were coded in a way that allowed a clear connection with their respective photos. 20 photos were obtained. All of the photos were shown to the participants on a screen the day after, so they could pick out the one they believed best captured the character of the landscape in question.

Presence of landscape features regarding vegetation, topography, land use, built structures and movable objects were determined for each of the photos. Based on these properties, the photos were hierarchically clustered in R software using Jaccard's distance, generating three groups, representing three different views of the same landscape. Jaccard's distance is an asymmetric similarity measure used with binary data that emphasizes positive matching rather than negative matching of the attributes (KREBS 1999). This kind of similarity measure was chosen, because we were mainly interested in commonly included rather than commonly excluded features of the landscape.

Narratives associated with photos were compared and contrasted to find out what the similarities and differences within and between the groupings were. Keywords related either to the physical landscape (land use, field pattern, landmark etc.) or the aesthetics of the photo (best representation, all-inclusive, realistic representation etc.) were extracted out of the narratives. The comparison of narratives within groupings was aimed at discovering if the same landscape views also corresponded with a similar understanding of the landscape and, conversely, comparison between groupings to discover if different views also produced different understanding.

### **3 Results**

Most of the participants (79 %) declared they took a photo of what they believed to be a common/ordinary scene in that landscape, even if distinctive landmarks were framed in the background by many of them (60 %). A majority (89 %) did not pay special attention to the camera settings. The context of the training school – visual impact of wind farms on the landscape – only affected the scene choice of about one quarter of the participants (26 %).

The focal length ranged from 22 mm to 63 mm (expressed in 35 mm equivalent). The average was about 34mm and the median was 29 mm. This shows a tendency towards using moderately wide angles and remains close to the angle of our immediate field of vision (LA VALLE 2016 in press).

Gestalt theory suggests humans perceive systems as a whole instead of its constituent parts. Conversely, most of the obtained narratives adopt a deconstructed description of landscape, referring to various elements such as hedges, fields, roads, hills etc. with no mention of the relationships between these elements. Only two of the narratives sum up the landscape in a more general category, one being “wild nature” and the other “green Ireland”. The former seems especially interesting since it suggests extrapolation of a concrete landscape to a nationally representative landscape. Furthermore, it is interesting to note that most narratives do not ostensibly value the landscape, but merely describe it, with one exception labeling the landscape as “beautiful”. SWANWICK (2004) argues that characterizing and valuing landscapes are separated, which in this study holds true also for individual’s perceptions. On the other hand, this observation contrasts with the findings of SCOTT et al. (2009), who report that direct experiences of landscapes are tightly connected with valuing, mostly deriving from specific purposes for being in the landscape at that time.

This divergence can be explained by this study’s participants’ backgrounds (experts) and the fact that they were not engaged in any other activity except observing the landscape. A close link between landscape and the concept of nature is shown by a quarter of the narratives which aimed for “the least disturbed view”, “nature without infrastructure” and “green Ireland” or only referring to natural elements. Also supporting this view, but from the other side, are some narratives stating they wanted to show the anthropogenic impact on the region. Four narratives noted certain elements in the landscape were intentionally omitted from the photos because they are “so unlike its surroundings”. Three narratives state there is something missing in the photo, namely roads and electricity poles.

The clustering of photos was based on landscape features included in photos, such as hedges, forest, fields, meadows, houses, powerlines, fences, hills etc. One group consisted of half of the photos, one of six and one of four photos. Unsurprisingly the groupings correspond to different directions in which the photos were taken. Figure 1 shows examples of photos in each group.

The first group was dominated by views toward a distinct hill (Great Sugar Loaf) and features such as fields, hedges and built objects (figure 1, top row). Most of the narratives in this group explicitly refer to the Great Sugar Loaf, which differentiates this group from the others. The Great Sugar Loaf is characterized as a “landmark”, “extraordinary”, “main characteristic in landscape” and “iconic”. It seems that this single element defines the landscape for the individuals in this group, although referring to the land use is also a recurring theme in this group. Exposing a landmark in the landscape might also suggest an attempt to differentiate this landscape from the others. In this group, The Great Sugar Loaf is a factor of localization, which is also supported by narratives referring to it by its proper name.

The second group concentrated on views over a heather meadow with hills in the background (figure 1, middle row). The terrain is a flat area bordered by hills. The foreground is dominated by heather meadow, a common point of narratives of the group. There are no obvious landmarks. These narratives refer to vegetation and do not often mention land use. Only in

this group some narratives explicitly omit certain elements out of the picture. In two cases they deliberately left out elements such as infrastructure, suggesting these individuals look for an undisturbed part of the landscape and regard human imprint as harmful. In one case the omitted element is the Great Sugar Loaf itself, on the account of being “so unlike its surrounding”. This supports the claim that the Great Sugar Loaf is a genius-loci generating element. Deliberate omission of landscape features also suggests participants in this group tried to find the most homogenous scene in the landscape, but also possibly the most “natural scene”.



**Fig. 1:** Examples of photos in group 1 (top row), 2 (middle row) and 3 (bottom row)

The third group was mostly characterized by a relatively flat terrain (figure 1, bottom row). Narratives from this group emphasize the “all-inclusiveness” of the photos taken. The character of the landscape in this group seems to come from a mixture of anthropogenic (“buildings”, “fences”) and natural elements (“hills”, “trees”, “grass”). It is therefore not surprising that one participant labeled the landscape as “not wilderness, not urban”. Two narratives expose land use with the mentioning of “cultivated land” and “fields”, with one of them saying the photo is not showing simply the visual appearance, but also suggests the function of the landscape.



**Fig. 2:** Most representative photos of the landscape in question as stated by the participants

When the participants were asked to pick the most representative photo out of the whole array, half of them picked someone else's photo, reducing the total number of photos to 10. Figure 2 shows which photos were most selected (54 % of prevalence). The chosen photos are also the most representative of their respective groups, further supporting the validity of clustering the sample size. The experiment poses questions around the prevalence of either common/typical or unique/extraordinary features in the ideal representation of a scene, and the deviations by which these distinctive features were described by individuals through either picturing or writing. This dichotomy – between prevalence of ordinary or extraordinary landscape features, or *softscape and hardscape* as defined by SCHWARZ (2005) has been largely discussed in literature. The way they both generate a comprehensive scene – as perceived and described by the observer – will be further analyzed.

## 4 Discussion

The method allowed us to find common points in the characterization of this landscape, but it also exposed clear differences between declared narratives and their respective photos. Considering that the survey was held after the picture session, can of course produce substantial effects on the declared goals. Taking into account this time delay, we noted that authors often nudged the narrative towards an idealized understanding of the memorized scene, instead of a clear description of the actual picture which was taken.

Sometimes important background landmarks were not intentionally included, even if they were positioned in a relatively central position on the landscape. Also infrastructural elements such as T-poles were ignored within narratives, even if having a dominant presence in the actual pictures. The road infrastructure was in most cases ignored and excluded from photographs, inevitably reducing the practical scope of choice. In all cases, the consideration of pictures collectively displayed was more suggestive in finding evidence and patterns than the single picture analysis.

Drawing on the above results, the reasons for participants' choices of a view seem to be the following: for the first group a greater emphasis on the sense of place, for the second naturalness, and for the third the coexistence of anthropogenic as well as natural features. This suggests that exposed differences don't stem just from favoring different elements in the landscape but also from different conceptualizations of the landscape itself. Such a conclu-

sion is in line with findings of other studies, which show that people hold certain abstract images of landscape, which influences the perception of actual landscapes (BUIJS 2009).

The concept of giving as much latitude as possible to participants to come up with their own understanding of landscape also means reduced control for the researchers. It is up to researchers therefore to interpret and make sense of the gathered data. In our case we had the focus of narratives to help interpret the photos, but they also had to be interpreted. Often the narratives would describe the photo redundantly as the “best representation”, “sums up the landscape” or “most representative” – thus only repeating the instructions they were given and not necessarily providing any additional explanation. Weather, mood of participants, personal backgrounds, to name just a few, might also influence what was photographed. Finding the right balance between controlling the experiment and evoking unbiased virgin experiences of landscape is certainly an interesting issue to tackle in future research endeavor. Also most narratives describe the contents of the photo (e. g. “plain, fields, hills”) and not necessarily the reasons per se (e. g. aiming to show “how the landscape functions”). This might demonstrate either a very simplistic understanding of landscape, or alternatively an insufficient engagement in the experiment. Other factors such as handwriting and poor language skills (for most participants, English was not their native language) can also influence readability and interpretation.

The drawback of this survey is its size and non-random sample of participants, which is a recurring issue within PGI research (BALOMENOU & GARROD 2016). It was, however, our aim to explore individual differences in appreciation of landscape. Small sample size makes it easier to examine individual’s visual experiences of the landscape, a need that is advocated by SCOTT (2009). KAPLAN (1996) argues that sample deficiencies do not hinder an experiment, if it’s conceptualized properly. Nevertheless, due to a very small number of participants the findings should be regarded simply as a glimpse into the plurality of readings of landscape.

While the sample size is too small to generalize from the results, the devised method proved efficient in exploring the narratives behind participant generated photographs and could be used for evoking people’s values of a landscape and encourage discussions about them. Besides additional validation of results, there is also a lot of digital potential for further research especially diving deeper into metadata, developing visual metrics (e. g. SIBILLE et al. 2009) and advanced textual content analysis of descriptions provided by participants.

## 5 Conclusion

The ecological validity of PGI has been discussed based on two apparent limitations: the controversy between on-site and photo-based analysis; and the appropriateness of the individual rater, rather than the group average, as a unit of analysis for tests of validity (HULL & STEWART 1992). Despite the prevalence of individual raters as an accountable unit of analysis for PGI, this small experiment suggests that differences in landscape perception by means of successive loops of group production and individual evaluation should be appreciated and exploited in the general search for appropriate assessment of digital applications.

If the observer is required to make a binary judgment (“I like it” or “I don’t”), he/she needs only to establish a single criterion value. Forced-choice and ranking procedures require the

observer to distinguish among the landscapes being evaluated, but they generally provide only an “ordinal ranking with little indication of relative preference intensities” (DANIEL & BOSTER 1976: 10). But when the observer is forced to make a post-produced description of his and the rest of the group’s choice, the evaluation entails higher potential. This experiment endorses a self-regulated and participatory method in which both the individual and group average perception is equally considered through an iterative process of engagement. This conceptualization stands on the premises that scenic perception is an interactive concept and landscape a responsive entity. These assumptions could be exploited in further assessment applications or linked with Social Media photo-based apps as in Pinterest, Facebook or Instagram.

Evolutionary theories explain landscape preferences as a result of human evolution (TVEIT et al. 2012: 39). The inherent subjectivity of landscape perception research deters some from engaging in this arena and compels others to question its validity. Many authors however petitioned for a move toward subjectivist approach to landscape perception research (LOTHIAN 1999; see also DANIEL 2001; SWANWICK 1989), a call that was largely answered in the past few years. Even if consistent literature stands on these environmental preference factors, the state of the art is lacking new methods on PGI clustering and more interactive sampling surveys.

The existing social gap between public support for renewable energy and the low success rate for development applications is demanding new and revisited surveys that comply with an apparent “democratic deficit” regarding public engagement (BELL et.al. 2013: 1) and satisfy the urgent need for updated understanding of the notion of responsive landscape. Although there is a high consensus in VAQ results for positively perceived landscapes (KALIVODA et al. 2014), exposing diversity of views and disagreement factors could be more productive in assessing controversial landscape changes such as wind farm developments, and other initiatives, plans and policies affecting the collective perception of landscape.

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