Changing Perspectives

On the Visual Properties of an Iron Age Mound

Lars Gustavsen

Abstract

This paper presents a reassessment of mound visibility through the analysis of Halvdanshaugen, a substantial Iron Age mound in Norway. In line with conventional views, the mound's visibility covers a considerable swath of the surrounding terrain, although views are limited by topographic features from certain directions and specific parts of the landscape. However, a refined viewshed analysis, incorporating vegetation as a visual barrier, suggests that the mound's visual impact extends no more than a few hundred metres from its base. This sees the mound placed in an enclosed setting which alters the mound's visual characteristics, emphasizing details of both the mound and activities nearby. In contrast to traditional interpretations that emphasize landscape-wide symbolism, this study advocates for a more reflective perspective, and calls for a multi-sensory understanding of the fluid relationship between mound and landscape. It rejects the idea of universal placement rules and proposes more contextual interpretations that acknowledge the diversity observed in mound construction and use.

Keywords: Iron Age, mound, visibility, viewshed analysis, GIS, rivers, remote sensing

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Introduction

Large mounds from the later parts of the Nordic Iron Age (*c.* 400–1000 CE) are traditionally interpreted as mortuary structures constructed for and by social elites, and are seen as the physical manifestations of the increasing social stratification and centralization of power believed to have occurred during the first millennium CE (e.g. Bratt 2008:170; Gansum & Oestigaard 2004:73; Myhre 1992:311; Skre 1998:323; although see Fallgren 2023). However, few of these mounds have seen excavation as per modern standards, and their interpretations often rest solely on their external and physical attributes, as well as their placement in the landscape. These factors, it is claimed, held some shared symbolic meaning intended to be communicated to an audience, and this was achieved through sheer size, or by placing the mounds in topographically prominent places or near communication routes (Forseth & Foosnæs 2017:54; Gundersen et al. 2023:171; Larsen & Rolfsen 2004:65; Ringstad 1987:74).

The significance attributed to the visual characteristics of the mounds is predominantly derived from qualitative approaches, which rely on subjective experiences of the present landscape, while the application of quantitative methods to support these claims is rare. Furthermore, the presumption that visual impact was a determining factor in how people interpreted, or 'read', the landscape, overlooks the cultural and contextual factors shaping people's perceptions over time and space. Indeed, archaeological evidence in the form of excavations and geophysical surveys often contradicts the notion that visual prominence served as a primary determinant of mound placement (e.g. Bill & Rødsrud 2017:214–215; Gustavsen et al. 2020:1524–1527; Schneidhofer 2017). These demonstrate that mounds may be situated in diverse landscape settings, where visual prominence is often negligible, suggesting that other placement strategies may have been at play (as also highlighted by Gansum et al. 1997:15).

Thus, it is clear that a new approach to interpreting mound placement and form, where physical characteristics and relationships with their surroundings are assessed more contextually and holistically, is needed. This study aims to demonstrate how this can be achieved through a reassessment of the visual characteristics of Halvdanshaugen, a substantial Late Iron Age mound in South-East Norway (Figure 1). It involves investigating whether the mound was intentionally constructed and placed to be seen from a distance, and whether there were specific parts of the landscape from which the mound was meant to be experienced. This will be achieved through a GIS-based visibility analysis, as well as a quantitative exploration of directionality and size perception, and I will demonstrate how the integration of remote sensing technologies can improve our understanding of how the

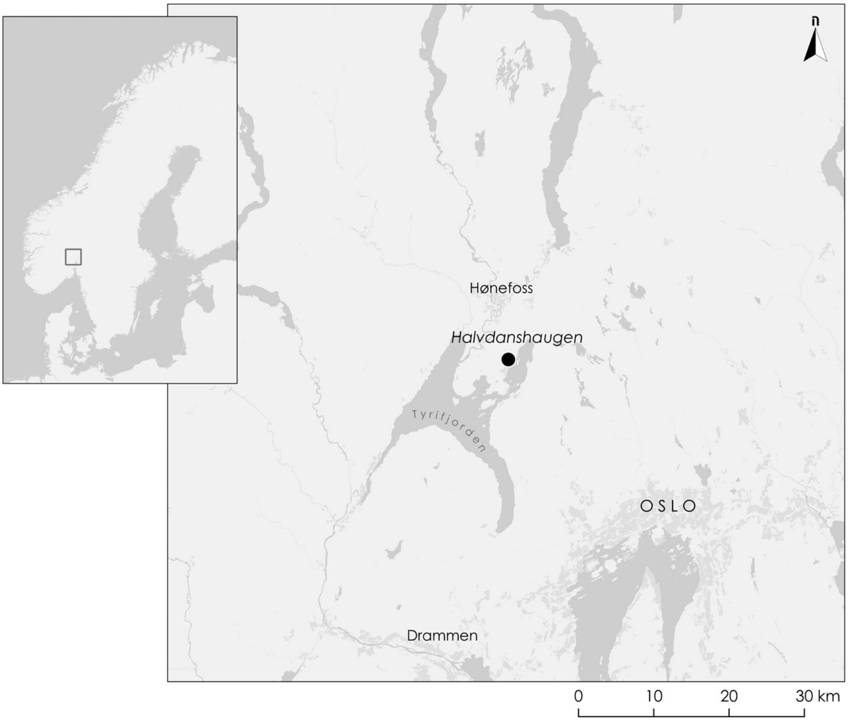


Figure 1. Location of Halvdanshaugen. Background map: Norwegian Mapping Authority, 2024.

physical environment surrounding the mounds may have affected their visual characteristics. Furthermore, I aim to highlight the potential dangers of placing too great an emphasis on visual range alone, while challenging conventional ideas about the visual impact of mounds on their surroundings.

BACKGROUND: THE VISUALITY OF MOUNDS

In Norwegian archaeological discourse, the visual qualities of mounds have historically been tied to ideas about status, both of the individual presumed to have been interred inside and their kin. Originating in eighteenth- and nineteenth-century topographical descriptions, these ideas were seized upon by early archaeologists, but only rarely extended beyond descriptions of aesthetics or fields of view. Notable exceptions do however exist, such as the discussion of the 'atypical' placement of the Oseberg mound (Brøgger 1917), and Georg Sverdrup's (1933:31) critical evaluation of the placement of Bronze Age mortuary structures.

Following an extensive lull in mound research in the decades after the Second World War, a resurgence in popularity occurred as the bonds between archaeology and history re-strengthened (Skre 1997:8). Heralding a greater emphasis on the symbolism of the mounds themselves, this allowed for a more reflective exploration of the relationship between mound construction and the dynamics presumed to be behind their construction (Gansum 1997:33; Hagen 1985:26; Myhre 1992:311; Skre 1998:322–326). Here, visuality was key:

> For the people who built large burial mounds and burial cairns, it was essential for the monument to be seen. There is something obvious about this when building big. The importance of being seen is also evident from the fact that large burial monuments are often located in prominent places where they dominate their surroundings (Ringstad 1987:73 [my transl.]).

Accordingly, large mounds were seen as the physical manifestations of a hierarchical social structure, where their external appearance and placement served as visual expressions of status, and where their construction was tied to the ability to garner resources, people, expertise, and the organizational and logistical capacity required for such an undertaking (Ringstad 1987:75; Skre 1997:37–38). A greater focus was thus placed on the relationship between the mounds and their setting in the physical landscape and, notably, a formal approach to visual landscape studies was developed, in which terms and concepts adopted from landscape architecture were introduced (Gansum et al. 1997). These described how the landscape can be defined in terms of 'landscape rooms' and outlined a qualitative method for evaluating the visible relationships between these and the archaeological structures they contain. Furthermore, the placement of archaeological structures could be defined through how they visually 'addressed' the landscape, that is, whether they overlooked or could be seen from certain parts of a landscape. From this, it was argued, archaeological structures can be codified using dichotomous qualities such as 'introvert/extrovert', 'inclusive/exclusive' and 'public/private'. This method laid the ground for a more formalized approach to archaeological visibility studies, which found particular relevance in cultural landscape management (Jerpåsen 2009), although it also faced criticism, primarily for adopting a synchronous perspective on the landscape and assuming an ocularcentric stance (Solli et al. 2010).

Despite these developments offering the potential for a more sensorial approach, mound studies have largely remained centred on socio-political aspects, where the function of mounds was to serve as symbolic markers of social standing or identity, or to demonstrate some form of (largely undefined) power in the landscape (Bratt 2008; Drageset 2017:183; Forseth & Foosnæs 2017; Gansum 2013:53; Gansum & Oestigaard 2004:64; Gundersen et al. 2023:174; Gustavsen et al. 2020:15–16; Larsen 2016; Moen 2011:32–33; Myhre 2015:158; Reiersen et al. 2023:89; Sæbø 2020:49). A parallel line of interpretation sees mounds as the visual affirmations of land ownership or the farm holder's right to inheritance (Ødegaard 2010; Østmo & Bauer 2018:245; Pedersen 2006:351; Rødsrud 2020:219; Zachrisson 1994).

Within these interpretational approaches, it is argued that mounds were deliberately and strategically placed in prominent places to ensure visibility from a wide swath of the landscape, or near communication routes, such as roads, sea lanes or rivers, or near central nodes in the landscape to be observed by those passing by (Cadamarteri 2022:105; Ellingsen & Sauvage 2019:407; Forseth & Foosnæs 2017:54; Gansum & Oestigaard 2004; Reiersen et al. 2023:89; Skre 2018:776; Thäte 2007:131–162).

Considering the emphasis placed on the visual characteristics of mounds, it is somewhat surprising that the application of quantitative methods to underpin this is limited, a fact that cannot be attributed to a shortage of suitable datasets or software solutions, or the lack of comparative studies of mortuary structures elsewhere (e.g. Ballmer 2018:101–102; Bourgeois 2013:111–114; Kuna et al. 2022; Llobera 2007; Wheatley 1995). That said, a few noteworthy, published examples from the Nordic region do exist where viewshed analyses have been used, largely involving investigations of placement strategies for cairns and mounds from the Bronze Age (Lagerås 2002, 2005; Løseth 2010; Løvschal 2013; Risbøl et al. 2013) and the Iron Age (Drageset 2017:181; Ellingsen & Sauvage 2019:407; Larsen & Heide 2020:8–10; Maher 2014:91–92). Although demonstrating the applicability of the method, these examples are largely restricted to establishing simple visual relationships between observer and landscape, and they occasionally exhibit an uncritical approach to interpretation and method application, perhaps due to the absence of a solid theoretical and interpretative framework.

CASE STUDY: HALVDANSHAUGEN IN RINGERIKE

To provide an example of how viewshed analyses can be integrated into a more holistic approach to mound placement, in which the sensorial impact of the mound is considered, I have chosen to focus on the mound Halvdanshaugen (Halfdan's Mound) in Ringerike, South-East Norway (Figures 1 and 2). The rationale for selecting this particular mound lies in its historicity, its interpretation as a high status burial due to its size, position in the landscape, and its visibility, as well as its position in a non-urban landscape in which modern infrastructure only to a degree affect its visual qualities.

Taking its name from the petty king Halfdan the Black, Halvdanshaugen comprises a circular mound 55m in diameter and 5.5m high, situated on the fertile Steinssletta lowlands on the northeastern shores of Lake Tyrifjorden. It holds a prominent position in the present landscape, and the historical narratives associated with the mound have given it particular recognition in the archaeological and historical discourse (e.g. Larsen & Rolfsen 2004). According to this, Halfdan was a member of the Ynglinga

Figure 2. Halvdanshaugen is located in open farmland on the Steinssletta lowlands. Photograph: Hans A. Rosbach, 2020 (CC BY-SA 4.0).

dynasty and held dominion over large parts of southeastern Norway during the ninth century. Upon his dramatic demise, his body is said to have been dismembered and the various body parts interred in mounds across his realm in the belief that this would ensure bountiful harvests. One of these is the mound on Steinssletta, in which Halfdan's head was supposedly buried, although it has been argued that the entire account is a medieval fabrication (Stylegar 1997).

The mound was partially investigated archaeologically through a keyhole investigation and soil coring campaign in 1997, which revealed a complex structure composed of several layers of turves, clays and charcoal. Radiocarbon dates from the deposits indicate that the mound was raised in at least two phases between the fifth century and the tenth. As for any evidence of a burial, the excavators left empty-handed, as neither artefacts, constructional elements, nor osteological material were retrieved.

A comprehensive volume produced in connection with these investigations presented the results of the project and placed Halvdanshaugen into a broader cultural-historical and comparative context. In the brief discussion on the placement of the mound within its physical environment, it is maintained that it finds itself in an open landscape, which affords a wide view in all directions, including towards the lake to its east. While it is acknowledged that views to the south are somewhat limited by a sharp rise in the terrain, an onsite assessment demonstrated that the mound was clearly visible from the rise itself (Larsen & Rolfsen 2004:45). As for the mound's placement in the landscape, the authors find this 'very peculiar' because it is not located on elevated land, which they claim, without offering substantial comparisons, is common for burial mounds. However, it is argued that this is a characteristic shared with the richly furnished burial mounds at Gokstad and Oseberg, and it is used to highlight the alleged similarities between the three mounds:

> The Oseberg Mound is placed at the base of a wide valley, and the Gokstad Mound on a flat expanse. We would argue that there are views both to and from both of these mounds – much like the situation for Halvdanshaugen. The most important thing to consider here is that all three mounds are located in relatively open landscapes and not on ridges. Another common trait is that they are placed near routes of communication (Larsen & Rolfsen 2004:67 [my transl.]).

Thus, it is claimed that the visual qualities of the mound reflect its status and its current potential significance. It is held that the mound was intentionally constructed in a flat, open landscape to be seen and its prominence was reinforced through its strategic placement near historical thoroughfares. Assessing the validity of these claims, however, poses a challenge because they rest solely upon subjective, onsite observations. In the following, therefore, I will present a relatively straightforward quantitative approach which will assess the visual characteristics of this mound specifically and question the significance of mound visibility in general.

Method and Concept

CUMULATIVE VIEWSHED ANALYSIS

The conventional approach to GIS-based viewshed analyses of mounds entails placing an observer point directly on the part of the Digital Elevation Model (DEM) that represents the highest point of the mound, provided that the resolution is sufficiently high to do so, and then calculating a viewshed from this. No offset in height is assigned to the observer point, whereas the height added to the terrain is set to an approximation of the eye height of an adult human – typically 1.6–1.7m. Datasets generated using this setup consist of binary raster data, where pixels with a value of 0 represent non-visible areas, and pixels with a value of 1 show areas visible from the observer point. By assuming visual reciprocity between the observer point and the terrain, it follows that the results can be reversed to show from which parts of the terrain the observer point, and thus the mound, is visible. While this approach offers a straightforward means of assessing visibility, the results will be exaggerated because the locations from which even small parts of the mound can be seen will be included in the viewshed. This, in turn, may lead to an over-optimistic interpretation of the visual impact of the mound on its surroundings.

To counter this, an alternative approach was devised, in which the visibility of the *entire* mound structure was considered. This entailed a cumu-

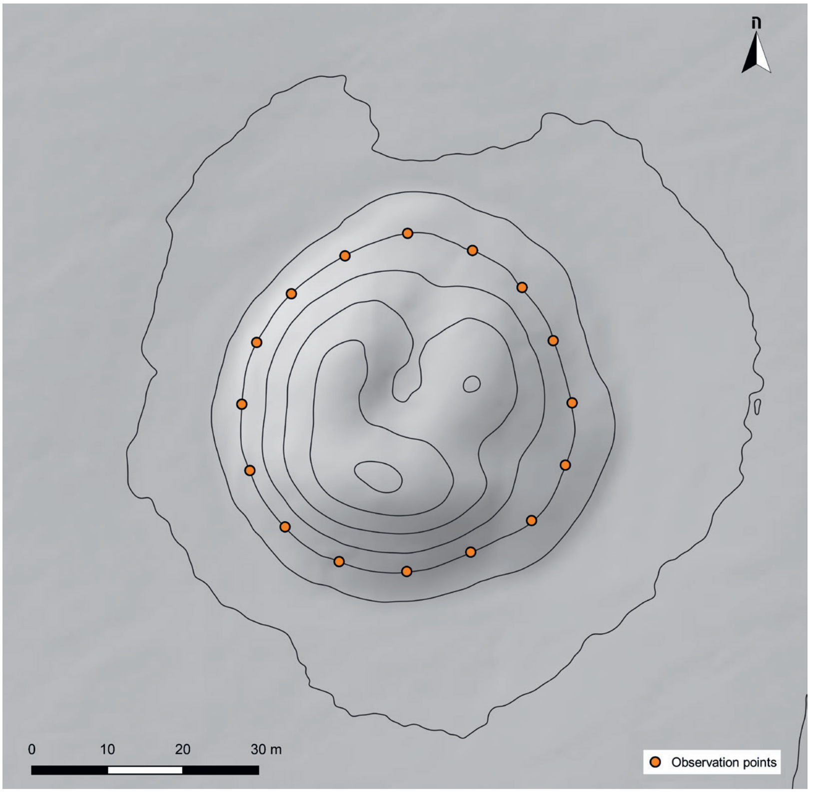


Figure 3. High-resolution LiDAR model of Halvdanshaugen showing the observation points. Background: Norwegian Mapping Authority, 2024.

lative viewshed analysis (Wheatley 1995) of a series of observation points along the mound's base. The individual viewsheds from these points were then summed to create a binary map showing areas in the landscape from where the mound was either in or out of view. The analyses were performed on high-resolution LiDAR data from the National Elevation Model program of the Norwegian Mapping Authority, comprising pre-processed, bare-earth digital terrain models in raster format with a resolution of 1m per pixel, resampled from a 5 pt/m point dataset. For the viewshed analyses, 16 observer points with no height offset were placed around the base of the mound, using the first 1m contour above the surrounding terrain as a guideline, and aligned with the mound's cardinal, intercardinal, and secondary cardinal axes (Figure 3). Placing the points along the first contour line was deemed necessary to avoid potential challenges posed by small-scale obstructions close to the mounds, which could impact the resulting viewsheds.

A cumulative viewshed analysis was then conducted using the open-source *Visibility Analysis* extension developed for QGIS (Čučković 2016),

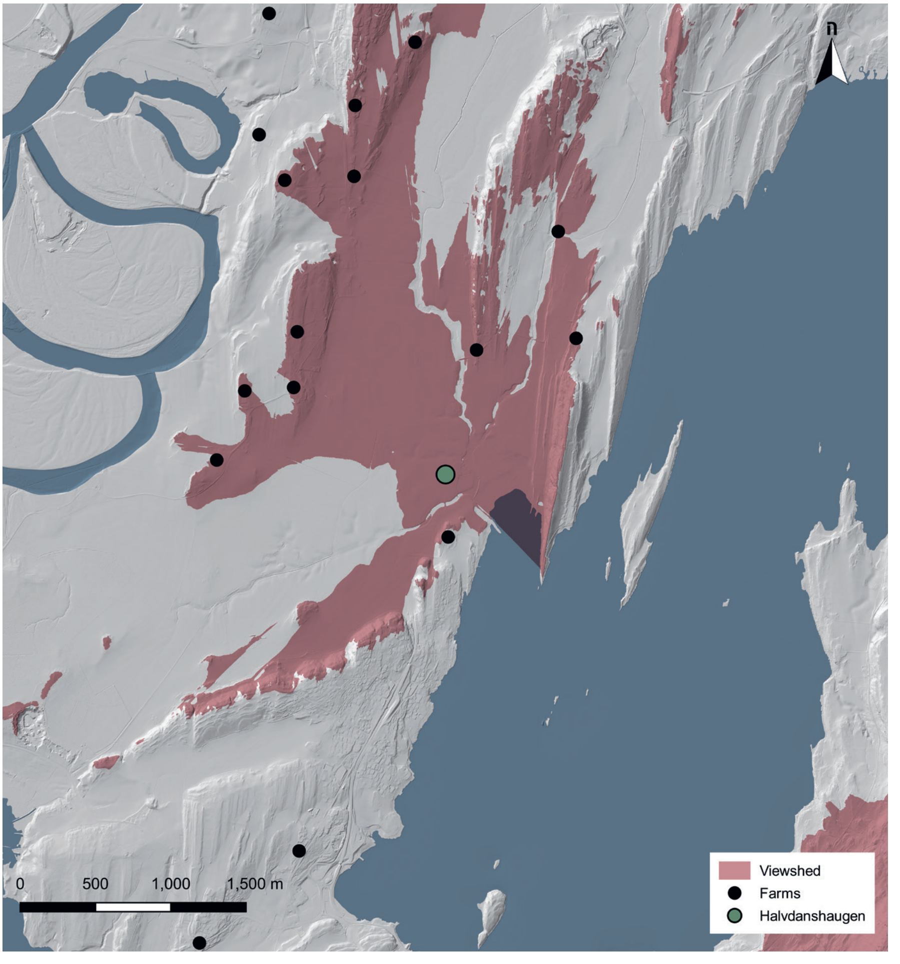


Figure 4. Binary viewshed generated from a cumulative viewshed analysis of Halvdanshaugen. Background data: Norwegian Mapping Authority, 2024.

applying a height offset of 1.65m to the surrounding terrain to simulate the eye height of an adult human observer in the landscape. The maximum extent of the analyses was set to 7000m to exceed Dennis Ogburn's (2006:410) limit of human recognition acuity of 6880m. Considering the nature of the terrain in which the mound is located and the physical characteristics of the mound itself, this number is excessively high but serves as a useful guideline for limiting the range of analysis. The binary viewsheds generated from each point were then combined into a single viewshed containing up to 16 distinct classes, classified according to how many observer points on the mound had 'seen' the corresponding pixels. Here, classes with a value below five were excluded to ensure that only data representing at least 1/4 of the mound structure were included in subsequent analyses.

The results from these initial analyses indicate that despite its low-lying position on the flats, the mound can be seen from a considerable swath of the landscape, particularly to the north and northwest (Figure 4). Conversely, views are somewhat restricted by sharply rising ridges to the south and east and by a slight rise in the terrain west of the mound.

QUANTIFYING VISUAL PERCEPTION

The viewshed analysis suggests that the mound is theoretically visible from several kilometres away. However, observations made during site visits have shown that this requires specific knowledge of where to look and what to look for. Moreover, its appearance from a distance may not significantly affect the observer's senses. Therefore, a more refined and nuanced approach to the viewshed analysis is needed, one that quantifies visibility while integrating qualitative descriptions obtained from several distances.

While established approaches such as those outlined by Peter Fisher (1994) and Ogburn (2006) have been developed to quantify falloff in visual clarity due to atmospheric phenomena, these have not been adopted for this study since the focus is on assessing the *visual impact* of the mound, rather than the maximum theoretical distance from which it can be seen. I have instead opted for an approach in which the change in size perception with distance is considered since this is a more or less fixed measurement of visual clarity. The approach chosen is a variant of that suggested by Marcos Llobera (2007:58), in which visual zones were defined according to the visual angle covered, or *subtended*, by a barrow at given ranges and using the width of a clenched fist at an arm's length as a visual reference. To add resolution to the approach, I have included measurements corresponding to the tip of a little finger, two and four fingers, and an extended hand held horizontally, all at 65cm from the eye, as reference units. The visual angle (α) for these can be calculated as

$$\alpha = 2 \times atan\left(\frac{\frac{Object\ size}{2}}{Object\ distance}\right)$$

to give the following measurements:

Table 1. Visual angles for different parts of a human hand held at an arm's length (65cm).

	Little finger	**Thumb**	**Two fingers**	**Four fingers**	**Vertical hand**
Width (cm)	1.50	2.00	4.00	8.00	18.00
Visual angle (°)	1.32	1.76	3.52	7.04	15.77
Percentage of 120°	1.10	1.84	2.94	5.87	13.14

This demonstrates how different parts of the hand subtends portions of the nominal human visual field of 120° when held 65cm from the eye. For instance, a little finger measuring 1.5cm in width will subtend a visual angle of 1.32°, or just over 1 per cent of the human visual angle, while an 18cm long hand held horizontally at the same distance subtends 15.77°, representing just over 13 per cent of the human visual field.

Using these values together with the width of Halvdanshaugen (55m), the distances at which the mound subtends the corresponding visual angles to the parts of the hand can then be calculated as

$$\textit{Object distance} = \frac{\frac{\textit{Object size}}{2}}{\tan\left(\frac{\alpha}{2}\right)}$$

to produce the following ranges:

Table 2. The distance at which the visual angle of Halvdanshaugen can be correlated to the values calculated in Table 1.

Distance (m)	**Rounded (m)**	**Subtended by mound (°)**	**Rounded (°)**	**Equivalent constant**	**Percentage of 120°**
198.563	200	15.77	16.0	Vertical hand	13.14
447.060	450	7.04	7.0	Four fingers	5.87
894.965	900	3.52	3.5	Two fingers	2.93
1790.352	1800	1.76	2.0	Thumb	1.47
2387.219	2400	1.32	1.0	Little finger	1.10

This demonstrates that, when viewed from a distance of 200m, the mound subtends a visual angle of approximately 16°, which corresponds to an 18cm long hand held horizontally at an arm's length. At the other end of the spectrum, at 2400m, the mound subtends only 1.32° of the visual field, akin to a 1.5cm wide little finger held at arm's length. By adding these bands to the previously generated viewshed, we gain a clearer understanding of how the mound's perceived size changes with distance, and how this influences an observer moving through the landscape (Figure 5).

Given that landscape practices associated with mounds are likely correlated with distance (Llobera 2007:58), the analysis serves as a helpful entry point for discussing the potential visual impact of Halvdanshaugen on its surroundings. This necessitates a short exploration of how the mound and other landscape elements are perceived from the established distance ranges.

The initial range is defined by a 200m band extending from the mound. Within this range, attention is directed to the visual qualities of the mound itself and on individuals interacting with it, and to a lesser degree to the

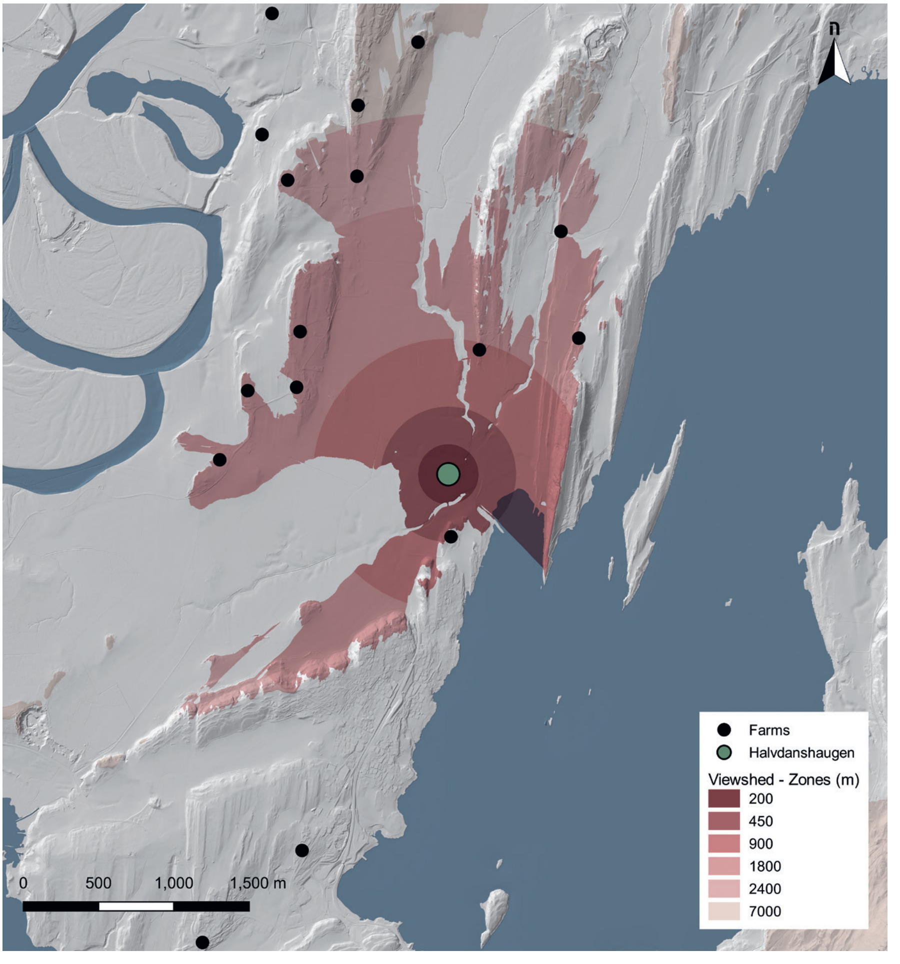


Figure 5. Visual bands added to the viewshed. Background data: Norwegian Mapping Authority, 2024.

broader physical environment. The characteristics of the mound's surface, including grass and small-scale vegetation, can be observed. Leaves and branches on trees can be seen moving, and the wind can be heard blowing through the trees. The physical details of people are readily discerned, and the nature of activities taking place near the mound can be perceived. Essentially, the range embodies immediacy and senses beyond mere sight.

Within the second range, spanning from 200 to 450m, the mound remains clearly visible, albeit with some loss of detail. The trunks, branches, and foliage of trees on and around the mound can still be identified, but they begin to appear indistinct and may not always be readily visible. While the details of individuals remain observable, it may be difficult to work out the

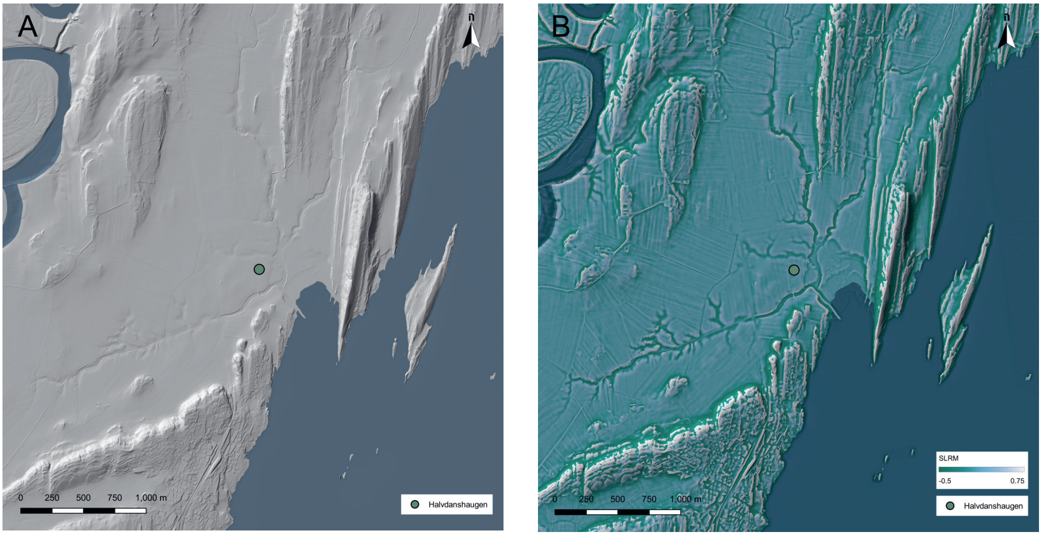
Figure 6. Halvdanshaugen as seen from a vantage point some 700m to the north. The mound is in the centre of the picture. In its present landscape context, it appears indistinct against the background, and its visual impact on its surroundings is negligible. The photo is taken with a 50mm lens to simulate a field of view similar to the human eye. Photograph: Lars Gustavsen, 2024.

specifics of their activities, and along the outer limits of the range, senses other than vision begin to play a lesser part. Overall, the scene begins to resemble the middle ground of landscape art.

Further out, the third range covers the distances between 450 and 900m away from the mound. Here, clusters of trees and single, very large trees can be recognized, but only as outlines. Human figures, while recognizable as such, gradually blur into the broader backdrop. Likewise, the mound is still recognizable, but its visual clarity begins to decline. Depth of field is lost to the observer, and the mound starts to blend into the general backdrop, particularly in adverse atmospheric conditions. At this point, the visual impact of the mound is arguably negligible (Figure 6). To paraphrase Tadahiko Higuchi (1983:12), the observer 'sees but does not feel'. Beyond this range, visual clarity is greatly reduced, and visual identification of the mound becomes difficult without prior knowledge of its existence. In short, it seems that the visual impact of the mound can be largely confined to the first two ranges, that is between 0 and 450m from the mound. Here, details of the mound, the landscape elements and the people and their activities can be readily identified, and senses other than just the visual are engaged in the experience.

SIMULATING PALAEOLANDSCAPES USING LIDAR

Several processing and visualization methods have been developed to overcome problems such as occlusion and directional illumination inherent in



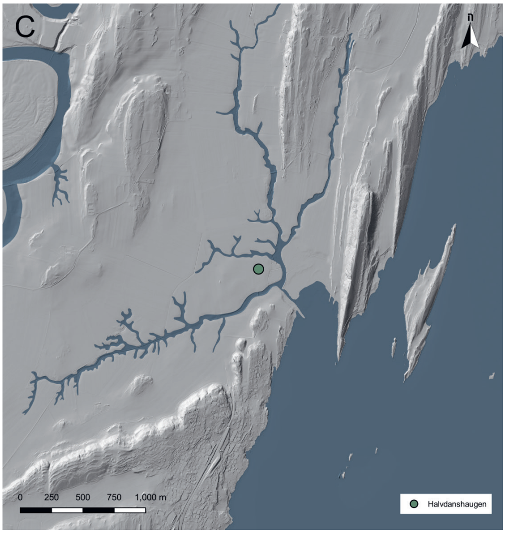


Figure 7. (A) Hillshade model of the areas surrounding Halvdanshaugen. (B) Local Relief Model blended with the hillshade model to enhance the palaeochannels skirting the mound. (C) Interpretation of the palaeochannels. Background data: Norwegian Mapping Authority, 2024.

common DEM relief shading techniques (Kokalj & Somrak 2019). One such approach is the Local Relief Model (LRM), a trend removal method in which a smoothed terrain model is subtracted from the original, high-resolution model to create a new dataset containing the local deviations from the overall landscape forms (Kokalj & Hesse 2017:20–21). The resulting datasets emphasize subtle elevation changes, and while originally intended to enhance small-scale archaeological features, LRM has also proven to be highly suitable for revealing extensive but subtle landscape forms such as palaeochannels.

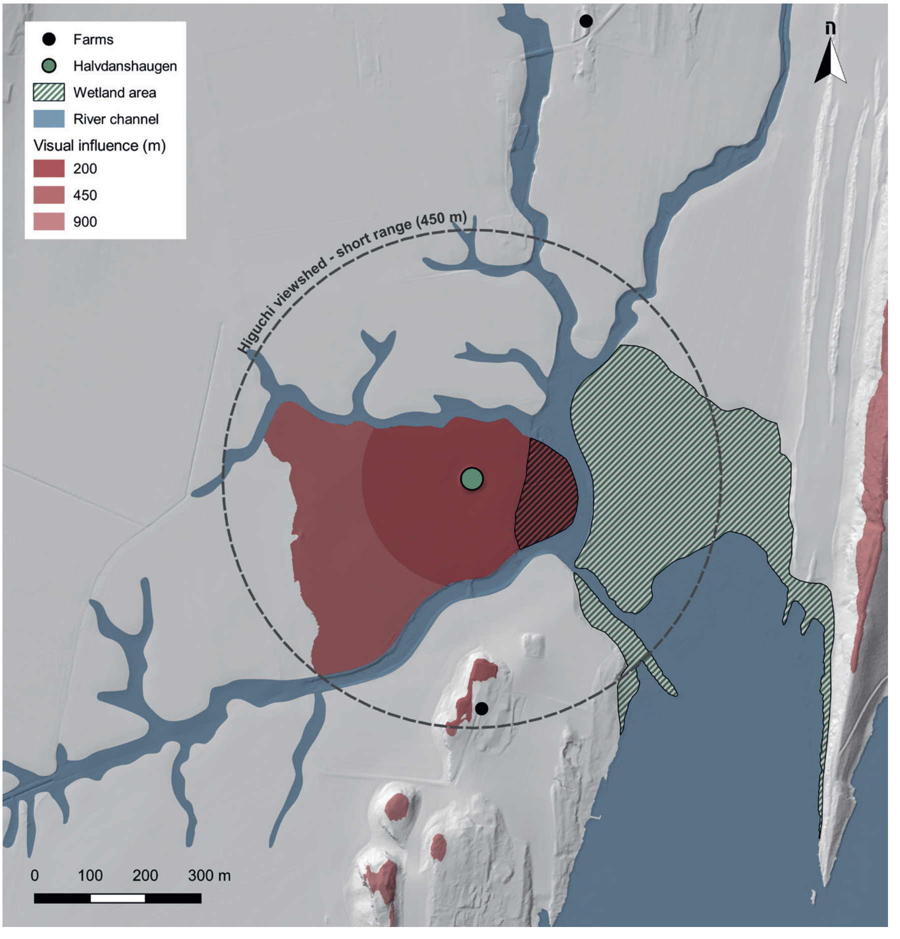


Figure 8. A refined viewshed restricted by riparian vegetation surrounding the mound. Background data: Norwegian Mapping Authority, 2024.

As can be observed in Figure 7 (A), the DEM for the Steinssletta lowlands include details of a palaeolandscape which can be difficult to discern through standard hillshade modelling. To enhance these, therefore, an LRM was generated using the Relief Visualization Toolbox extension for QGIS (Kokalj & Somrak 2019). An appropriate colour ramp was then added to the model and a fairly narrow histogram stretch (-0.5–0.75) was used to add contrast to the visualization (B). This was then combined with the hillshade model, and the enhanced palaeochannels could be digitized for further analyses and interpretation (C).

In these visualizations, at least four former, infilled river channels can be seen incised into the clayey soils which dominate Steinssletta, demonstrating that the area was not as homogenous as the present landscape suggests. Two of these river channels pass the mound to the north and south respectively and form a confluence with two additional river channels east of the mound before entering the nearby lake. Naturally, the rivers cannot be dated using the LiDAR data alone, but their position about the mound suggests a plausible coexistence. This has a considerable impact on how the placement of the mound should be interpreted both in terms of its relationship with its natural surroundings, but also considering how these elements might have impacted the visibility of the mound.

To simulate the impact of vegetation on the viewshed, the information from the LiDAR visualizations was used to increase the corresponding raster values in the DEM by a fixed value of 10m, to serve as a proxy for a combination of dense undergrowth and fairly tall, riparian vegetation such as willow, hazel and alder. A new cumulative viewshed analysis was then carried out using the same parameters as before, and as seen in (Figure 8), this has a drastic impact on the visibility of the mound, reducing the viewshed from covering large swaths of the Steinssletta lowlands to an intimate landscape room covering the mound's immediate surroundings.

Discussion

QUANTIFYING AND QUESTIONING VISIBILITY

The visibility analyses of Halvdanshaugen demonstrate that the mound is theoretically visible from a large swath of the landscape, which is largely due to the mound being situated in flat and open terrain with few visual barriers, particularly towards the north. Topographic features of the terrain limit views from the west, south and southeast, and have the effect of restricting the mound's visibility from the nearby lake. This means that, if approached by boat, the mound would not have been seen in its entirety until the wetlands on the northern shores of the lake had been reached, and it questions whether the mound was intended to be experienced from the lake at all. Another interesting aspect is that the mound appears to be visible from nearby farms which, on toponymic grounds, may have their origins in the Iron Age. The significance of this relationship should, however, be treated with some caution since the temporal relationship between the mound and the farms cannot be readily determined and may simply be due to the physical characteristics of the modern terrain rather than any intentionality on the part of the mound builders.

Moreover, observations made on site indicate that, while it is physically possible to see the mound from this distance, the sensorial impact on the observer is not very significant. Thus, it was deemed necessary to refine the viewshed by dividing it into separate ranges from which the details of the mound and its surroundings could be assessed. The results from these explorations indicated that the visual impact of the mound is limited to a distance of less than a few hundred metres, within which details of the mound can be readily seen and identified, along with details of vegetation, and of people and activities taking place. Beyond this distance, the mound begins to blend in with the overall landscape and contrast to the general background is lost. Eventually, it is not possible to see the mound without prior knowledge of its existence, or without resorting to other clues in the landscape.

Here, the ideas formulated by Higuchi (1983:12–17) serve as an interesting comparative approach. According to this, the near-distance range can be determined by a radius equivalent to 60 times the size of the dominant tree species. In the case of the Steinssletta lowlands, this is the common silver birch (*Betula pendula*), which typically has a crown diameter of 6–9m. Using the average of this, the Higuchi near-distance range for Steinssletta is determined to be 450m, which covers both of the previously calculated near ranges for Halvdanshaugen. This range has been described by David Wheatley and Mark Gillings (2000:16) as one in which objects are 'perceived as being immediate and close to the viewer, engaging all of their senses', while beyond this, the viewer 'does not feel, but merely views'. Despite the limitations of the Higuchi approach due to the broad and imprecise ranges it produces, it is noteworthy that the near-distance range aligns closely with the ranges identified in comparable studies, such as those carried out by David Fraser (1983:299) on megalithic buildings in Orkney, and by Llobera's (2007:58) work on round barrows in the Yorkshire Wolds, where similar zones were established.

At this point, it is worth emphasizing that the quantitative analyses were conducted on a bare-earth model of the landscape which, free of visual hindrances, will return exaggerated results. As can be seen from the LiDAR visualizations, however, Halvdanshaugen is skirted by two clearly defined infilled palaeochannels, which merge with two additional channels before entering the nearby lake to the east. Thus, assuming that mound and rivers coexisted, the mound would have been constructed on a raised spit of land at the confluence of flowing bodies of water, and not in a wide-open landscape as its present situation implies. If we can further speculate, riparian vegetation such as alder, willow and birch, along with dense shrubs might have lined the river banks, forming dense visual barriers and restricting views to and from the mound. To evaluate the potential effect of this, a new viewshed of the mound was therefore generated, in which the presence of vegetation was included.

For simplicity, I chose to represent vegetation along the riverbanks with a solid and opaque, digital 'wall'. While this model did account for variations in height, foliage density, or seasonal changes, it effectively demonstrated the effect of tall and dense riparian vegetation that might have populated the river channels, the results revealing that views to and from the mound would have been greatly reduced and largely confined to the spit of land upon which the mound was placed.

These findings have important implications for how we understand the placement of Halvdanshaugen in relation to its surroundings, and they highlight the active role of rivers in shaping and structuring the physical, visual and cognitive landscape around the mound. At the very least, the rivers and the vegetation along their banks formed an immediate, enclosed space into which the mound was placed, and likely engendered an embodied, multimodal experience of the mound and its surroundings. It has been argued that mounds served as 'ritual arenas' (Gansum 2002:278–280; Price 2010:138–140; Sundqvist 2013:89–92), and without venturing too deep into speculation, perhaps this enclosed landscape room should be interpreted as a continuation of this into the wider surroundings, serving as communal places where activities related to the mound such as feasting, ritual performances, or processions may have taken place (Llobera 2007:58; Murphy & Nygaard 2023).

Moreover, the presence of rivers dictated movement in the landscape, requiring interaction as people had to navigate alongside or around them, or by crossing them. According to Matt Edgeworth (2011:69), these engagements may have involved symbolic acts that included ablution rituals or votive deposition, and it points to the mound forming part of a ritual landscape in which natural elements were an integral part. Thus, an active, agential landscape can be suggested, which aligns with a growing appreciation and understanding of the cognitive significance of rivers and wetlands in prehistory (e.g. Bradley 2017:184–185; Edgeworth 2011:67–70; Fredengren 2011; Frost & Beck 2023; Hooke 2017; Leary & Field 2010:149–150; Lund 2010; Raffield 2014). Furthermore, a spatial and visual relationship between prehistoric mounds and bodies of water has been noted (e.g. Brøgger 1917; Harrison 2007:176; Maher 2014:89; Mees 2019:90–98; Moen 2011:26–27; Schneidhofer et al. 2017:427; Wessman 2010:69–75; Williamson 2008:106–112), and these are certainly a line of enquiry worth pursuing since they have the potential to inform us of landscape engagement in the past and how this relates to cosmological beliefs and ritual practice.

CONTRASTING IDEAS

The ideas presented above stand in contrast to ideas about mound visuality and placement in which these factors are typically seen as conforming to some underlying 'rule', and where ideas of status and power are conveyed through prominent visibility. As these ideas tend to be based on onsite, subjective evaluations alone, however, they are both conceptually and theoretically problematic.

From a conceptual standpoint, the interpretations tend to overlook the dynamic nature of landscapes, which are constantly shaped by natural processes and human activities. Thus, the current landscape is a result of millennia of alterations and, although the 'bones of the land' remain (Tilley 1994:73), it is likely quite different from its appearance at the time of the mounds' construction. A pitfall common for quantitative and qualitative analyses alike, a failure to account for these changes may lead to a misreading of the landscape, and the visibility of a mound may be misinterpreted as being unrealistically high. Similarly, visibility is typically assessed either from the mound itself or from an unspecified point nearby (Gansum 2013:40; Larsen & Rolfsen 2004:45; Moen 2011:41–43), the assumption being that there is a symmetrical relationship between the portions of the landscape seen from the mound and from where the mound can be seen in the landscape. However, this assumption does not necessarily hold true in practice. While it may be possible to observe a distant physical element such as a farm from a mound, it does not automatically follow that the mound is easily observable from the farm – as demonstrated by the analyses in this article.

More pressing are the underlying theoretical foundations underpinning these interpretations, which are related to how we approach mounds and their connections to the landscape, as well as how we consider vision as part of the human experience of the world. By focusing exclusively on the physical attributes of the mounds – such as their size or appearance – we remove them from their original contexts and elevate them as human-built constructions detached from the landscapes of which they formed an intrinsic part (Gansum et al. 1997:25). This approach overlooks the active and cognitive role of the landscape (Tilley 1994:25–26), which is evident in how and where mounds are placed in relation to 'natural' features (if such a thing exists). Similarly, this detachment ignores the generative and reiterative qualities of the context into which the mounds were placed (Jones 2012:21). Mounds reference their landscape settings, but by virtue of being placed into the landscape, these contexts change, and the process is reiterated through referential construction, reshaping or reuse. Again, this is evident in the archaeological record, which shows temporal diversity within single mound sites (Østmo 2020), as well as phased construction and reuse of individual mounds (Thäte 2007; Cannell 2021). Thus, neither site nor mound can be seen as static 'stamps' onto the landscape, constructed with a specific function, but rather as fluid components of similarly fluid landscapes.

Another theoretical concern, which is pertinent to both GIS-based and analogue visual studies, is the emphasis on vision as the dominant mode of understanding the world. In this *visualism*, vision is compartmentalized, separated from the rest of the sensory modalities, and reified. However, as argued by Yannis Hamilakis (2014:9), vision is not an autonomous field, but rather 'a perceptual mode closely entangled and interwoven with all other senses in a synaesthetic, experiential manner', underlining that human engagement with the world cannot be reduced to the act of merely *seeing* (Frieman & Gillings 2007). This is not to argue that vision is unimportant in human perception; however, it never operates independently of the other senses. It is culturally and historically situated, and thereby not objective (Gillings & Goodricke 1996:1.4). Thus, the importance attributed to vision and its elevated position in the hierarchy of the human sensorium within modern, Western culture cannot be universally transposed onto other cultures, whether past or present.

Conclusion

In this article I have sought to challenge the common understanding of mounds as visual symbols in the landscape. Through the quantitative approach presented in the article, coupled with existing knowledge of mounds – their construction methods and their artefactual and osteological contents (or lack thereof) – a more complex range of interpretations becomes possible. Using the Late Iron Age mound Halvdanshaugen as an example, cumulative viewshed analyses were performed, considering the entire mound's visibility based on high-resolution LiDAR data, multiple observer points placed along the mound's base and the impact of potential palaeoenvironmental conditions.

The results from these analyses suggest that the primary focus of the mound's construction lay in creating an intimate, perhaps multisensory, experience for those interacting with the mound and its surroundings. Consequently, communicating symbolism across the landscape was unlikely to be a primary concern. This prompts us to question the significance traditionally attributed to the visual characteristics of Iron Age mounds in general, and to what degree these aspects governed the placement of mounds in the landscape. If mounds were *not* constructed to be visible over a great distance, then why were mounds placed where they were? What made one location more suitable or right for siting the mound than another?

The answers to these questions are undoubtedly diverse because, despite similarities in external appearance, mounds show variation in construction method and content. Consequently, their intended meaning is also likely to be diverse (Gansum 1997:31), making the exercise of finding universal rules for their placement arguably futile. As Terje Gansum and Terje Oestigaard (2004:64) have pointed out, it is unlikely that mounds were placed in the landscape without some forethought. However, instead of seeing this as tied to aspects such as communicating social roles, or economic factors, I argue that the location 'strategies' should be interpreted from a perspective where the mounds formed an intimate part of their natural surroundings, perhaps entwined with and referencing these.

By rejecting the idea that mounds were constructed to convey some universally recognized symbolism of social or political status, new and perhaps more fitting avenues of interpretation become available to us. To investigate these avenues, however, a more reflective approach to mounds is needed. This should highlight the relationship between the mounds and their natural surroundings, while embracing a multimodal approach that extends beyond the visual. Furthermore, it should recognize placement as contextual, situated and diverse, reflecting not just temporal and environmental aspects, but the culturally and socially dependant experiences of the people who built and used them.

In this respect, it is interesting to note that alternative and more nuanced approaches to mounds are emerging, in which the focus has shifted to the significance of the mound construction itself, as well as the mounds' interaction with the physical landscape, allowing for a wider spectrum of interpretative possibilities (e.g. Cannell 2021; Leverkus 2021:72–73). These lines of enquiry hold the promise of a greater understanding of the original appearance of the mounds and could potentially be used to enhance our understanding of their original visualities. Were, for instance, particular materials used to make the mound stand out against its background (Bradley & Fraser 2011:44–45), or were they chosen to make the mound blend in with its surroundings? Were the surfaces of the mounds maintained through grazing or was regrowth encouraged (Lagerås 2002:188)? In short, did their visualities really matter? Ultimately, by adopting such a perspective, which transcends traditional interpretations and embraces the complexity of these structures within their environmental and cultural contexts, a more nuanced understanding of Iron Age mounds may be achieved.

Acknowledgements

I would like to thank Rebecca J.S. Cannell and the anonymous referees for their constructive and incisive feedback on an earlier draft of this paper.

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