The Partial Eclipse at Isandlwana
Astronomy, Physiology, Ornithology

By Grant Hutchison

Ever since it became generally known that an eclipse took place during the Battle of Isandlwana, historians of the Anglo-Zulu War have been alert for mentions of this phenomenon in eyewitness accounts. A small number of suggestive reports have been found, mentioning episodes of gloom or darkness, changes in the sun's appearance, transient shadowing of the landscape, and unusual silence. These have fed into popular accounts of the battle, in which the landscape is said to have been "plunged into darkness" and the battle fought in "eerie, shadowed twilight". But while in many cases the witness accounts appear to match phenomena associated with a total solar eclipse, they bear almost no resemblance to the moderate partial eclipse that occurred at Isandlwana on 22 January 1879.

We can reconstruct the Isandlwana eclipse with great accuracy. The online version of the *Five Millennium Catalog of Solar Eclipses*[i] (henceforth, *FMC*) tells us that it started at 11:10 GMT, with the sun close to overhead, 74º above the horizon. It reached maximum at 12:36, at an elevation of 55º and almost due west; and ended at 13:52, with a solar elevation of 39º. (The calculator offers times to a fraction of a second but, given the uncertainty of battlefield timings, such precision seems irrelevant.) There was no uniform time zone in South Africa in 1879, so we need to convert GMT to Local Mean Time - effectively sundial time. At Isandlwana's longitude, that's two hours, two-and-a-half minutes later than Greenwich. (But it seems unlikely that any of the watches at and around Isandlwana on that day accurately reflected Local Mean Time.)

The *FMC* also tells us that the eclipse had a magnitude of 0.649, a number that has been a source of some confusion. Magnitude is a linear measure, indicating how far across the solar disc the moon intrudes; it does not imply that 65% of the sun's light is blocked. Because of the curvature of the overlapping lunar and solar discs, the obscuration is always less than the magnitude. For the Isandlwana eclipse, obscuration was 55.6%. While this may seem dramatic, it is in fact a trivial change, given our eyes' ability to adapt to much greater changes in lighting.

Levels of illumination are measured in units called *lux*. We know from Hamilton-Browne's report that "not a cloud was in the sky" as the battle began,[ii] and under those conditions, with the sun about 50º above the horizon, as it was during maximum eclipse at Isandlwana, illuminance is normally around 100,000 lux. The eclipse would reduce this to 44,000 lux. For comparison, a mere 3,000 lux provides sufficient illumination for even the finest of tasks, including surgery and watchmaking.[iii]

If a 56% reduction in daylight illumination happens suddenly, our pupils can compensate promptly by dilating to double their area, thereby ensuring that exactly the same level of light reaches our retinas. We have a momentary awareness of the change, and then vision returns to its previous level. But the light during a partial eclipse dims extremely slowly. At Isandlwana it took an hour and twenty-six minutes to make the transition. So a mix of pupillary dilation and a progressive change in retinal sensitivity would have taken place,[iv] ensuring that the gradual change in lighting was imperceptible. So, while a small number of

eyewitnesses mention “gloom” or even darkness, this cannot be ascribed to the eclipse. In fact, almost all of us have lived through several similar eclipses without noticing. For a given spot on the Earth’s surface, partial solar eclipses occur about once every 2.6 years.[v] About a third of those will exceed the magnitude of the Isandlwana eclipse. Unless they are extreme (>90%) they are rarely mentioned in the media and largely go unnoticed.

A number of Zulu accounts have been collected, stating that the sun “got black” or “turned very dark”. Again, while this reminds us of the appearance of a total eclipse, it is completely unlike the appearance of the sun during a moderate partial eclipse. The uneclipsed part of the solar disc has the same surface brightness as the full disc, and is therefore just as dazzling and dangerous to look at as the uneclipsed sun. Permanent retinal damage can result, a condition called acute eclipse retinopathy.[vi] Filtering by cloud or smoke would reduce the danger, but would result in a visible crescent, not a black disc.

George Mansel’s report[vii] that “the sun was shining on the camp at the time, and then the camp looked dark, just as if a shadow was passing over it,” is also superficially attractive as a potential eclipse phenomenon. However, using data from the *FMC*, we can calculate that when the eclipse at Isandlwana reached its maximum of 55.6%, the sun’s disc was obscured by 55.5% at Helpmekaar, 55.8% at Rorke’s Drift and 55.2% at Mangeni Falls. The shadow of a partial eclipse is demonstrably huge, and its gradient correspondingly subtle. It does not generate transient shadows the size of a military camp.

The “utter silence” reported by the Zulu boy Umsweanto[viii] also has some appeal as a potentially eclipse-related event, reminding us of how birds are said to become silent during a total solar eclipse, because the level of illumination during totality falls to levels usually associated with deep twilight. But there has long been debate about the reality of this phenomenon during moderate partial eclipses, because illumination remains above the level experienced under a light overcast,[ix] which would not be expected to affect birds’ behaviour. There is also a significant potential for expectation bias – birdsong is naturally variable, and if it reduces in volume by chance during a partial eclipse, it’s easy to interpret this as having been caused by the eclipse. But the North American solar eclipse of 2024 was monitored by a continent-wide set of audio monitors, revealing that birdsong was not suppressed unless the eclipse exceeded 99% obscuration.[x] So the Isandlwana eclipse is an unlikely cause for Umsweanto’s “utter silence”.

None of this is intended to cast doubt on the sincerity of eyewitnesses. But it does suggest that we need to explore other explanations for these reports: smoke from black powder and burning tents; a dense crowd of men appearing like a shadow when seen from a distance; the use of evocative metaphor; and the revision of memories in the light of emotional state and subsequent knowledge.

---

[i] Espenak F, Meeus J. *Five Millennium Catalog of Solar Eclipses: https://eclipse.gsfc.nasa.gov/SEcat5/catalog.html*

[ii] Hamilton-Browne, G. *A Lost Legionary in South Africa.* London: T Werner Laurie, 1912. p129.

[iii] Le Grand Y. *Light, Colour and Vision*, 2nd Edition. London: Chapman and Hall, 1968. pp.83–4.

[iv] Khurana AK, Khurana I. Chapter 6.6 Visual Adaptation in *Anatomy and Physiology of the Eye*, 4th Edition. New Delhi, CBS, 2024.

[v] Jones G *et al*. The frequency of solar eclipses for a given place: A new approach to a classic question. *Journal of the British Astronomical Association* 2026; **136(4):** 239–46.

[vi] Khatib N *et al*. Acute eclipse retinopathy: A small case series. *Journal of Optometry* 2014; **7(4):** 225–8.

[vii] Colenso F, Durnford E. *History of the Zulu War and its Origins.* London: Chapman and Hall, 1880. p292.

[viii] Webb C de B (ed.) A Zulu boy's recollections of the Zulu War. *Natalia* 1978; **8:** 6–21. (Reprinted from Swinny GH. *A Zulu Boy's Recollections of the Zulu War and of Cetshwayo's Return*. London: George Bell & Sons, 1884.)

[ix] New Buildings Institute. LUX: Overcast Sky. *https://patternguide.advancedbuildings.net/using-this-guide/analysis-methods/lux-overcast-sky.html*

[x] Mann *et al.* Continental-scale behavioural response of birds to a total solar eclipse. *Nature Scientific Reports* 2025; **15:** 10113.

Editor's clipse notes for the following article.

For further information about the eclipse, the following might be useful.

1. Account by uMhoti of the uKhandempemvu (uMcijo) regiment, papers of Trooper F. Symons, Natal Carbineers, Talana Museum, Dundee, SA.

2. Account of uNzuzi Mandla, Natal Mercury 50th anniversary supplement, 22 January 1929.

3. Included in Bertram Mitford's *Through the Zulu Country; Its Battlefields and its People'*(1883).

4. The pocket diary of Lt. W. Cochrane of the 32nd Regiment, serving with the 'Native Horse', for example, included a printed entry for 22 January; 'eclipse, visible South Africa, Madagascar etc'.

5. The journalist, Charles Norris-Newman, recalled that even when viewed from Mangeni, twelve miles away, 'the sun was shining brightly on the white tents, which were plainly visible'.

6. *In Zululand with the British* 1880. Commandant Hamilton-Browne of the NNC recalled 'a huge black shadow that lay on the hills … Not a cloud was in the sky, so I knew that the black shadow resting on the hills must be the Zulu army moving down to attack the camp … *A Lost Legionary in South Africa*, (1913).

7. Symons papers, Dundee Museum.

8. Included in Mitford, *Through the Zulu Country.*

9. See 'Mbilini, Manyonyoba and the Phongola Frontier', in Laband and Thompson, Eds. *Kingdom and Colony at War*, 1990.