Can you use a coconut to find groundwater?

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SUMMARY

Divining has been used for centuries for groundwater and mineral prospecting. Historically, divining has been reliant on a rod, or pair of rods, accompanied by a particular individual. Recently, the use of fluid-bearing containers was cited as a viable water divining technique by a popular Indian 'youtuber'. We numerically simulate the response from a coconut using an appropriate robust statistical method, similar to that deployed by the diviner in their videos. Coincidentally, a clear response in the rotation of the coconut is generated wherever the diviner desires. Our results indicate that divining is and remains at the whim of the practitioner. Unfortunately, this pseudo-science pervades in the modern day and discredits other methods of remote subsurface imaging.

Key words: groundwater, dowsing, divining, pseudoscience

INTRODUCTION

The precise origins of water divining remains unknown, perhaps dating back to ancient civilizations. Early divining is believed to have used a divining or 'dowsing' rod to forecast events or search for objects. The first recorded use of the word 'dowse' was in 1962 by John Locke, who referred to a forked stick a 'dowsing rod' or virgula divina (divine twig). The earliest inception of a divining rod was in 1556, by Georgius Agricola in De re Metallica. Numerous publications exist throughout the following centuries, including Claude Galiens' discovery of mineral waters near Chateau Thierry, 1630 AD (Herschy 1998).

History of the dowsing rods in southern Europe was not restricted to water, however, with multiple cases of mines, minerals, and buried treasure existing from the latter 16th century. By the arrival of the 17th century, the dowsing rod had spread through most of Europe. The introduction to England is believed to come from German miners imported to Cornwall circa 1558-1603.

The early 20th century saw the first instance of serious scientific analysis given to water divining. Sir William Barret is accredited with two extensive volumes of research into the topic in 1897 and 1901, and his subsequent work with Theodore Besterman 1926 formed the most comprehensive study of dowsing at the time (and possibly still). Their study cites examples of dowsing back to the Neolithic era and beyond.

Water divining is typically classified into one of two major fields, based on the objects used. These include: (i) Rhabdomancy, using different types of rods (rhabdos = rod and manteia= divination), and (ii) radiesthesia (or pallomancy), using different types of pendulums. The first name indicates the sensitivity to radiations: pallomancy derives from the Greek words pallo = to shake and manteia = divination.

Modern divining continues to live on despite being debunked multiple times. An article published recently showed that 10/12 water companies in the UK routinely employ divining rods in addition to proven scientific methods. Other anecdotes exist from Canada, France, and the USA where divining rods have been used in a professional setting.

Figure 1. An early example of water dowsing, approximately 1700.

The advent of modern communications has given voice to many extraordinary claims. For water divining, a man from India, known locally as "The Lightning Water Diviner" has multiple millions of views on his YouTube channel. His method of water divining relies on the rotation of hydraulic forces within a fluid-bearing body to 'detect' groundwater.

Modern scientific approaches routinely prove no correlation between proclaimed 'diviners' and statistical success. There are many 'explanations' for why divining 'works'. These include magnetic variations, extrasensory perception (ESP), cryptesthesia (a form of clairvoyance), divine intervention, the work of the devil, fairies, otherwise undetectable radiation fields, dielectrokinetics (a pseudoscience term for energy fields produced by living things), and other paranormal phenomena that extend beyond the realm of physics and therefore cannot be debated in a rational discussion.

A self-published critical review of dowsing from the Office of the State Archaeologist, University of Iowa in 2006 suggests that the simple act of concentrating on the dowsing sticks results in the affirmation required for dowsers to conclude subsurface parameters. For example, where the stick cross 'of their own accord'.

This is echoed by other sources, where the phenomenon is termed the Carpenter effect, or the 'ideomotor effect'. That is, the effect of miniscule involuntary muscle movement. This often results in some action unrelated to the person, and hence 'magic'. (e.g. Ouija boards, table turning, dowsing, etc.)

METHOD AND RESULTS

The key method for the aforementioned YouTuber, the lightning water diviner (LWD), is to use some fluid-bearing object (e.g. a coconut) to divine the location of groundwater.

The properties of coconut water (although apparently any fluid can be used) suggests that approximately 95/100 grams of coconut water is simply that - water. Approximately 3.71 g/100g is carbohydrate and < 1 g is proteins. That is, there is no clear indication of any minerals with properties susceptible to groundwater exploration (e.g. conductivity).

In one particular example, LWD used a coconut to detect groundwater point sources on agricultural land in Tamil Nadu, India. We numerically model the rotation response of the coconut over a synthetic grid traverse of the survey area. The diviner coefficient (DC) represents the location where the diviner chooses to see a response.

$$\theta = \begin{cases} rand(0,1) \\ rand(0,1) * 10 \; if \; x \approx DF \end{cases}$$

LWD also suggests fluid-bearing objects, such as an unfertilised chicken egg, and a lemon, can be used for divining. The equation is identical to that shown above. Of the sites that caused rotation of all divining objects, the depth was determined using a quartz pendulum and 'Bishop's rule'.

A definitive response of all divining objects was detected at approximately 260 m along the survey line. The coconut rotated up to 9.5 degrees, while the egg (2 degrees) and lemon (7 degrees) were slightly weaker, most likely due to the apparent viscosity of the internal fluid. The depth of the groundwater source according to Bishop's rule was ~7 m below the surface, after consulting a map of the regional groundwater table (Figure 5). 'DF' is, coincidentally, 260 meters in the simulated example.

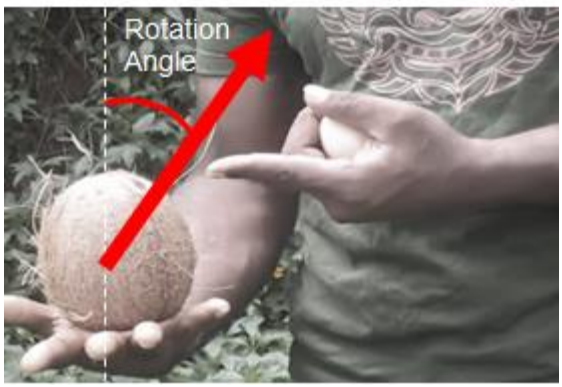

Figure 2. Placement of the divining object (coconut) on the diviner's palm. The rotation angle of the coconut is measured from the normal line of the palm

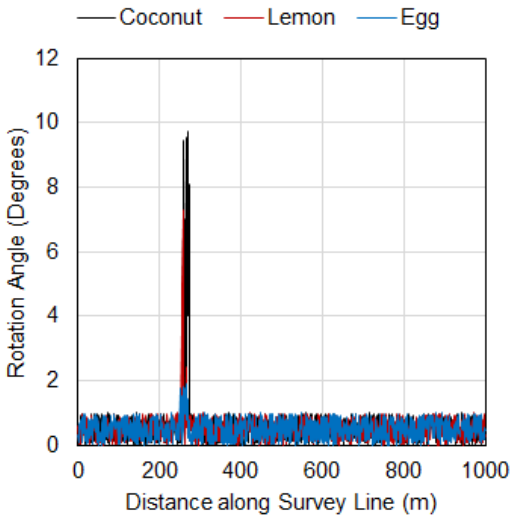

Figure 3. Continuous measurements of the rotation of the divining objects along the survey line

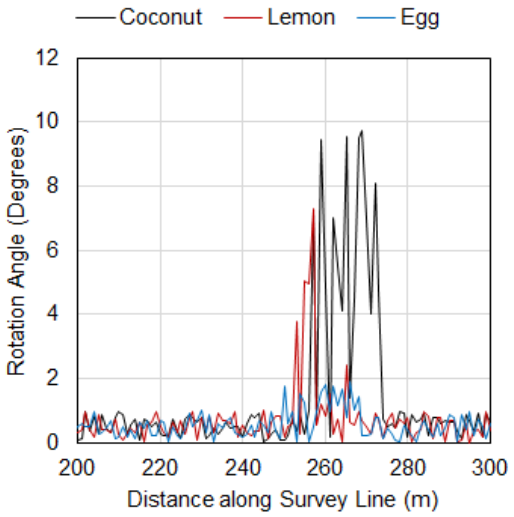

Figure 4. Area of highest rotation between 250 m and 270 m from all divining objects

Figure N, below, shows the regional water table from May 2014. According to this, LWD could have found water anywhere between 5 and 10 meters, no matter where the coconut suggested.

Figure 5. Groundwater table map of Tamil Nadu, dated May 2014. The approximate location for the LWD is highlighted in the cutout. Here, groundwater is approximately 5 - 10 meters below groundwater level. (GROUNDWATER YEAR BOOK OF TAMIL NADU AND U. T. OF PUDUCHERRY (2014-2015))

CONCLUSIONS

Of course, there is no physical explanation for water divining, none least of which by use of the coconut. LWD was able to 'find' groundwater simply due to moving their hand at some point, where groundwater already exists. This is clear from any of the videos, yet the mythos of divining pervades even despite no scientific evidence supporting its use.

It is important to identify pseudo-science and understand the physical principles of any subsurface imaging method.

Although this may seem obvious, there are numerous examples throughout history of geophysics being sold as snake oil, on par with the example shown here. It is our hope that, eventually, all of these myths will eventual be removed from society.

ACKNOWLEDGEMENTS

The data presented here is farcical, and is intended for humour only. This is evident by the supplied equation, however we apologise if any confusion remains.

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