

Elucidating the Phantom Phantom

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Research magnetic resonance imaging (MRI) faces the negative effects of the phantom phantom, a spirit that haunts the MRI system, specifically targeting inanimate “phantoms” used for imaging in the absence of a willing human. The detrimental effects of the phantom phantom are strongest when frustration is high. Here, given appropriate frustration, it is shown that the phantom phantom can be imaged directly, and that the appearance of the apparition can be linked to established orchid legend.

Introduction

RESEARCH IN MAGNETIC RESONANCE IMAGING (MRI) can involve long scan times: too long for even the most dedicated graduate student to lie in the cramped magnet bore. A phantom, or a test object such as a container filled with agar, oil or other contrast-producing substances, is often used for preliminary imaging. Unfortunately, the resulting images can be contaminated by an MRI ghost, or phantom. The phantom phantom has been shown to be responsible for a decline in signal quality, for the inability to recompile computer programs or reconstruct image data, and for the presence of large “spikes” or “voids” in data collection (Yancey, 2008). The effects of the phantom phantom may also extend to subject discomfort as well as hardware failures.

Although common, this artifact has not yet been fully documented. The phantom phantom is elusive. To rid the research magnet of such a demon, an exorcist must

have a clear picture of the phantom phantom in its full, natural form. It is hypothesized that given sufficient frustration, the phantom phantom can be imaged directly, and that these images can assist in understanding and clearing the ghost from the magnet. Thus, this study ultimately aims to develop a more perfect understanding of imperfect data.

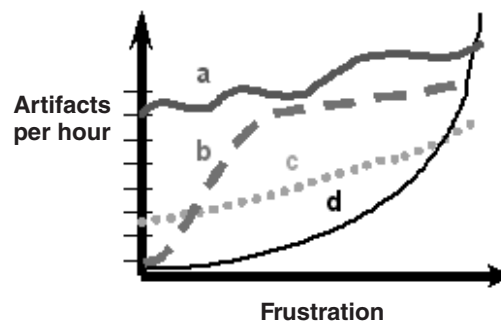


Figure 1 | Frequency of phantom phantom increases with (a) time until deadline (b) number of people meeting for dinner (c) expectation and (d) chance of nice weather.

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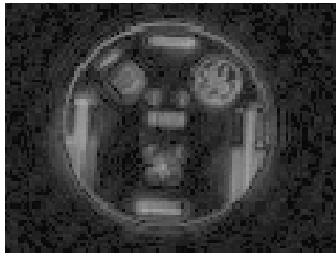


Figure 2 | Phantom without phantom phantom.

Materials and Methods

Previous studies (Yancey, 2008) have linked the appearance of the phantom phantom to frustration (Figure 1). The ideal condition for the phantom phantom is just before deadlines, when tolerance is low and equipment availability is rare.

To replicate the ideal, high-stress conditions, and to make the phantom phantom comfortable, a high level of pressure and resentment was allowed to build before beginning the experiment.

A standard, detailed phantom (Figure 2) was imaged with a real-time four-shot spiral sequence. This sequence was chosen to increase expectation; it was reliable on the neighbouring MRI system and was stable on the possessed magnet the day before the experiment.

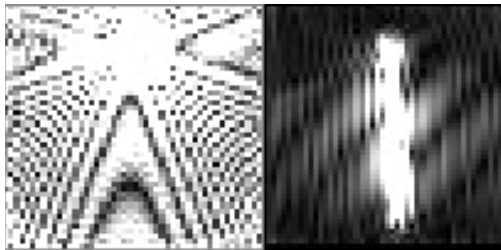


Figure 3 | Failed attempts to image failure.

Results

The experiment was repeated multiple times to image the phantom phantom clearly. Often, evidence of the phantom

phantom was obvious (Figure 3), but inconclusive. The phantom phantom can clearly be seen in Figure 4. Not surprisingly, the phantom phantom appears in the form of an orchid.

Discussion and Conclusions

Aside from appearance, the phantom phantom and orchid have multiple similarities. The original purpose and use of both subjects was medical, and like artifacts, there are more than 300,000 varieties of orchids. In San Salvador, orchids marked the graves of sacrificed humans (Berliocchi

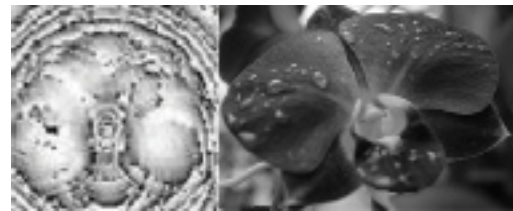


Figure 4 | Orchid-like phantom phantom (left) and actual orchid (right).

chi 2000), while here the phantom phantom marks the data of sacrificed evenings. In Bohemian legend the orchid (also called the 'hand of death') was created when the divine took pity on a distraught youth and changed her into a flower (Berliocchi 2000). Here, the phantom phantom took revenge on a distraught researcher and changed her data to a flower.

This study has imaged the elusive phantom phantom. Future work regarding elimination of the phantom phantom will be pursued with the aid of an exorcist.

References

Yancey, S. (2008) Personal correspondence, dreams, found drawings on napkins.
Berliocchi, L. (2000) Orchid in Lore and Legend
Portland, OR: Timber Press.