Bigfoots in the mist: Some evidence that paranormal beliefs may modulate perceptions of mythical creatures

Abbreviated title: Bigfoots: beliefs may influence perception of mythical
creatures

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Abstract

Some people are absolutely convinced that paranormal entities such Bigfoots, Ghosts, Aliens, and the Loch Ness Monster exist. In this alternative look at why a huge number of people report experiencing such things each year, we suggest that some witnesses of these phenomena may combine their strong beliefs in mythical creatures with their current sensory experiences of the environment they are in. This leads to the interpretation of noisy and ambiguous signals as being the mark of a Bigfoot. In two studies, we give evidence that paranormal beliefs modulate the perception of Gaussian filtered images, such that they identify more faces where there are none, and secondly, that those with stronger paranormal beliefs are most sensitive to detecting faces within random noise fields.

A well-known and striking claim within mythical and cryptozoological circles is that there exists a bipedal ape within North America (Meldrum, 2004). Of course, we recognise this as the **Bigfoot**, or the sasquatch, thought to have evolved from the extinct Asian ape species *Gigantopithecus blacki* some 2 million years ago in the early-to-mid Pleistocene. Of course, no evidence has ever been presented to substantiate such claims - but every year there are hundreds of reports (see www.BFRO.net) of people claiming to have seen, or in some cases, smelt, heard or even touched, such beasts.

In this work, we wanted to have a sidewise glance at what might be driving these claims. Given cryptids, such as Bigfoot, being household name with worldwide appeal, there is an interesting lack of psychological research into what *might* be a perceptual phenomenon - rather than purely a mythical one. Of course, in many instances there are plenty of reasons why people report seeing unbelievable objects or entities. Occam's razor tells us that it's probably most likely that in some or many cases people are simply lying. Here, we are most interested in those that are utterly convinced in what they have experienced.

The phenomenon is probably more interesting than it at first seems. We theorise that Bigfoot-witnesses are mistaking ambiguous signals in noisy sensory environments for the Bigfoot. This, idea, of course can be extended to any mythical creature or apparition. One may even be so bold to say that witnesses who read, see and hear stories of Bigfoot throughout their lifetime are primed to believe that what they are interpreting in a dense forest scene (for example) - is a Bigfoot.

If we take a moment to invoke the powerful Bayesian approach to visual perception (Bayes, 1763; Knill & Richards, 1996; Mamassian, Landy, & Maloney, 2002), we might then suggest that Bigfoot-witnesses hold a *prior* for such beliefs about the world. Thinking about this in abstraction, and according to Bayes' rule, Bigfoot-witnesses may combine their prior (the belief that bigfoots really do exist in the world), with the current

sensory evidence of a dense forest (likelihood function), with the resultant posterior belief that what they are seeing is indeed a bipedal ape (Fig. 1). Maybe this is the dawn of Bigfootception.

Figure 1. A Bayesian approach to Bigfootception. Prior beliefs about the existence of bigfoot are combined with current sensory evidence to generate a percept such as believing what you see or hear is a Bigfoot. Prizes for finding the bigfoot in the rightmost panel.

To vaguely test these assertions, we first considered two things: (1) Are people more likely to report seeing a face within a noisy image if they believe more in the paranormal? And (2) can subjects identify faces in a noisy environment?

We presented 100 subjects with Gaussian filtered images of everyday objects (not faces) that resembled a static random dot field (Fig. 2A). We simply asked subjects to report whether or not they saw a face in the image. After this part of the test, we then

asked subjects to fill in a paranormal belief questionnaire (Tobacyk, 2004); where a high score indicates a strong belief in the paranormal, and a low score indicates no belief in the paranormal. We found that as subjects' paranormal belief scores increased, so did the propensity to report that they had seen faces in the images (Fig.2B; $r = .70$, $p < .001$).

Figure 2. Methods and Results. (A) Example gaussian filtered stimuli used in both experiments. (B) Scatterplot of Belief in the paranormal and no of faces reported in Experiment 1. (C) Classification image for one subject in experiment 2.

In the second experiment, we utilised the classification images approach (Murray, 2011; Murray, Bennett, & Sekuler, 2002) for studying visual perception. Here we presented subjects with Gaussian filtered faces and objects (much like the image in Fig. 2A) and asked them to report whether or not they could see a face. We also, once again, measured subjects' belief in the paranormal (Tobacyk, 2004). Using classification images analysis (Murray et al., 2002), we took a weighted average of the hits (correctly identifying a face in the image) and false alarms (identifying a face when there wasn't a face present in an image). The result is fairly striking. The resultant image that appears out of the noisy mist is much the outline of a head and shoulders. Spooky. Interestingly, we calculated the *d-prime* for face detection sensitivity, but there was a small but significant correlation with the paranormal belief scores. This offers the intriguing possibility that paranormal beliefs may modulate perceptual experience through the form of priors - perhaps. Bayesian combination of priors and likelihoods results in posterior distributions that are more reliable (Di Luca & Rhodes, 2016; Ernst & Banks, 2002), and as such may help subjects' sensitivity to signals within noisy environments.

To our knowledge, this is the first study to look at the problem of false alarms in paranormal perception in psychology. Instead of ethnographic or false memory explanations of paranormal phenomena, the real basis of this paper is introducing the idea that one's belief in paranormal things such as ghosts, bigfoot, fairies and the loch ness monster can be explained in the Bayesian framework. To reiterate, this is purely an abstract conceptualisation of how prior expectations may overcome current sensory information to give rise to unbelievable percepts. This offers the intriguing idea that

witnesses to otherworldly entities are actually 'observing' these phenomena - the problem is that it's just a controlled hallucination.

Or... Bigfoots exist.

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References

- Bayes, T. (1763). An Essay towards solving a problem in the doctrine of chances. *Philosophical Transactions of the Royal Society of London*, 53(0), 370-418. <http://doi.org/10.1098/rstl.1763.0053>
- Di Luca, M., & Rhodes, D. (2016). Optimal Perceived Timing: Integrating Sensory Information with Dynamically Updated Expectations. *Scientific Reports*, 1-15. <http://doi.org/10.1038/srep28563>
- Ernst, M. O., & Banks, M. S. M. (2002). Humans integrate visual and haptic information in a statistically optimal fashion. *Nature*, 415(6870), 429-433. <http://doi.org/10.1038/415429a>
- Knill, D. C., & Richards, W. (1996). Perception as Bayesian Inference. Cambridge, UK: Cambridge University Press.
- Mamassian, P., Landy, M. S., & Maloney, L. T. (2002). Bayesian modelling of visual perception. In *Probabilistic models of the brain: Perception and neural function* (pp. 13-36). Cambridge, MA: MIT Press.
- Meldrum, D. J. (2004). Midfoot Flexibility, Fossil Footprints, and Sasquatch Steps: New Perspectives on the Evolution of Bipedalism. *Journal of Scientific Exploration*, 18(1), 65-79.
- Murray, R. F. (2011). Classification images: A review. *Journal of Vision*, 11(5), 2-2. <http://doi.org/10.1167/11.5.2>
- Murray, R. F., Bennett, P. J., & Sekuler, A. B. (2002). Optimal methods for calculating classification images: weighted sums. *Journal of Vision*, 2(1), 79-104. <http://doi.org/10.1167/2.1.6>
- Tobacyk, J. J. (2004). A Revised Paranormal Belief Scale. *International Journal of Transpersonal Studies*, 23(1), 94-98. <http://doi.org/10.24972/ijts.2004.23.1.94>