

Foreword

Hey again! Thanks to Bouncer we have *a* proposed solution for the theory of magic in a classical sense. It may also prove to be its downfall but I will leave that to your judgment. I loved how much people engaged with the previous paper and I recommend if you haven't read it to go and do so now as this assumes some level of knowledge. If you spot any major mistakes feel free to reach out to me (best is via email (gorillaofdestinytiktok@gmail.com) or discord). Otherwise, please bear in mind I wrote this in approximately one hour so if the writing is rough and error filled...sorry.

Have a lovely day, cheers!

- The Gorilla of Destiny.

Archmage of the University of Theoretical Magic (and all round idiot)

A Classical Solution to the Ultramagic Catastrophe

Letter: Submitted in response to the preprint “To Infinity and Beyond: Fatal Flaws in the Existing Theory of Magic” [2]

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Abstract

In [2], the author discovers a flaw in the original theory of magic which predicts infinite spell potential energy at the range. In this letter, we show that by renormalising the spell deformation amplitude according to $B(t) \propto \sigma_x(t)^{\frac{3}{2}}$ then we can provide a finite energy solution to the classical theory of magic. This also then results in physical justification for spells auto-casting at their range if we attempt to move them past. However, this work is far from complete and suggests that significant reformulation work is required, particularly for quantum magic theory.

1 Introduction

In a recent preprint, the author of [2] revealed a fundamental flaw in the formulation of The Theory of Magic [1]. In this brief letter we will attempt to present a “preservationist” (to use their terminology) approach which may provide an acceptable solution to this problem.

The Original Theory of Magic proposed to model the Weave as an elastic sheet, deformed according to:

$$f(\delta, x, t) = \frac{1}{2\pi\sigma_D\sigma_x(t)} e^{\left(-\frac{(\delta-\mu_D)^2}{2\sigma_D^2}\right)} e^{\left(-\frac{(x-\mu_x(t))^2}{2\sigma_x(t)^2}\right)} \quad (1)$$

with δ the damage, x the spatial, and t the temporal dimensions. Additionally we define:

$$\mu_x(t) = vt, \quad (2)$$

$$\sigma_x(t) = \lambda_0\left(1 - \frac{v}{R}t\right). \quad (3)$$

The impact of the changing width in the spatial dimension $\sigma_x(t)$ is to force the spell to vanish at $t = \frac{R}{v}$, or equivalently, when the spell reaches the range R . The spell is then projected through an aperture back to the material plane with the probability of the location of the aperture in the spatial and damage dimensions determined by the height of the deformation.

¹ They are my mistakes, me the real life person who is writing all of these papers to himself...the theory of magic, the flaws paper, and this rebuttal (with the insight and help of Lotus on Discord, of course, who actually found this mistake).

However, in [2], we see that this elastic model requires that the potential energy U_T stored in the weave is given by:

$$U_{\text{total}} = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{1}{8}\kappa \left(\left(\frac{\partial f}{\partial x} \right)^2 + \left(\frac{\partial f}{\partial \delta} \right)^2 \right) dx d\delta, \quad (4)$$

with κ a constant. They then *incorrectly* (we will avoid the urge to repeatedly mark their amateurish mistakes¹) calculate the integral result, but the overall form is correct. We find that this gives:

$$U_{\text{total}} = \frac{\kappa}{64\pi} \left(\frac{1}{\sigma_x^3(t)\sigma_\delta} + \frac{1}{\sigma_x(t)\sigma_\delta^3} \right). \quad (5)$$

This equation means that as spells reach their ultimate range and $\sigma_x(t) \rightarrow 0$, $U_{\text{total}} \rightarrow \infty$, which does not match any known evidence. In fact, it even suggests that the amount of energy contained within a moving spell *increases* over time, which also does not match physical phenomena.

2 Proposed Solution

To solve this, we propose a modification of the original form in eq. (1), defining the deformation instead as:

$$D(\delta, x, t) = B(t)f(\delta, x, t) \quad (6)$$

As $B(t)$ is independent of δ and x , it then moves outside the integral in eq. (4) giving:

$$U_{\text{total}} = B(t)^2 \frac{\kappa}{64\pi} \left(\frac{1}{\sigma_x^3(t)\sigma_\delta} + \frac{1}{\sigma_x(t)\sigma_\delta^3} \right) \quad (7)$$

We propose that $B(t)$ must then take the form:

$$B(t)^2 = A^2 \sigma_x^3(t). \quad (8)$$

Let us then say that at the range, the spell limits to an amount of energy U_R , such that:

$$\lim_{t \rightarrow \frac{R}{v}} U_{\text{total}} = U_R, \quad (9)$$

$$\lim_{t \rightarrow \frac{R}{v}} A^2 \sigma_x(t)^3 \left(\frac{1}{\sigma_x^3(t)\sigma_\delta} + \frac{1}{\sigma_x(t)\sigma_\delta^3} \right) = \frac{64\pi}{\kappa} U_R, \quad (10)$$

$$\lim_{\sigma_x(t) \rightarrow 0} A^2 \left(\frac{\sigma_\delta^2 + \sigma_x^2(t)}{\sigma_\delta^3} \right) = \frac{64\pi}{\kappa} U_R, \quad (11)$$

$$\Rightarrow A^2 = \frac{64\pi}{\kappa} U_R \sigma_\delta, \quad (12)$$

$$\Rightarrow B(t)^2 = \frac{64\pi}{\kappa} U_R \sigma_\delta \sigma_x^3(t). \quad (13)$$

This proposed solution, however, adds some interesting constraints:

If $U_R = 0$, $B = 0 \forall t$, and thus there is no deformation, so U_R cannot be 0.

If $U_R < 0$, A is complex, resulting in a complex amplitude for our deformation, which we do not expect (and is likely not possible²)

And so we must constrain that at the range, spells still have some amount of non-zero potential energy remaining. This *may* show that a classical theory of magic is self-contradictory and therefore not valid. We will discuss the potential interpretations of this later in section 3.

2.1 Rectified Energy Calculation

The form:

²I add this caveat because something in me tells me it somehow is but it is unlikely and as we will see later, would give negative energy results which is also not likely in the model

³Which I will deal with in another paper

$$B(t)^2 = \frac{64\pi}{\kappa} U_R \sigma_\delta \sigma_x^3(t), \quad (14)$$

can then be reintroduced to eq. (7) giving:

$$U_{\text{total}} = U_R \left(\frac{\sigma_x^2(t)}{\sigma_\delta^2} + 1 \right). \quad (15)$$

Meaning the total energy lost during spell movement is:

$$\Delta U = U_R - U_R \left(\frac{\lambda_0^2}{\sigma_\delta^2} + 1 \right), \quad (16)$$

$$\Delta U = U_R \left(\frac{\lambda_0}{\sigma_\delta} \right)^2. \quad (17)$$

Which differs from the results suggested in [3], marking a notable and very important impact this reformulation must necessarily have on previous works.

3 Interpretation

Finally to this letter, we will consider what this reformulation means for our interpretation of magic theory.

Firstly, the deformation is now no longer normalised (which is fine in this interpretation but means this solution cannot hold for the quantum approach to the theory of magic³). The deformation to the magic field shrinks as time goes on, at the moment of it hitting the range the spell still ceases to exist, but this factor shows that there is still energy which must go somewhere. We propose that this explains why spells, hitting their range, cast regardless. If we aimed to cast at a point beyond the maximum range $x > R$, the spell will still cast at $x = R$. The potential and kinetic energy are forced to expel from the field.

What this factor is is harder yet to explain and ideas are welcome. We believe it may be to do with the difficulty of moving in the magic field, as it relates to κ , which informs how much energy is required for a deformation and the width of the spell in the damage direction σ_δ . What isn't clear is why this then scales cubically with $\sigma_x(t)$, perhaps it is because we are moving in the spatial dimension and not the damage.

Finally, we can see that the potential energy of the spell is quadratic in nature, with its minimum at the

range. This may explain also why the range modification is possible in certain instances, perhaps through more efficient control of energy being released as the spell travels, or by giving the spell energy after the range to maintain it, or some other unknown mechanism related to the also unknown laws behind determining the range.

4 Conclusion

In this brief letter we have detailed a potential preservationist solution to the flaws highlighted in [2]. If the spell

shrinks its deformation as it travels then finite energy is achieved, with the caveat that the final potential energy at the spell range is > 0 . This may prove a contradiction but for now we believe it sufficient to say that our model predicts spells autocasting at their range if we attempt to move them past.

This solution also rules out the quantum approach to the theory of magic (as it stands now). This suggests that significant reformulation is required for the quantum approach, though it is the authors belief it should not be abandoned entirely.

References

- [1] The Gorilla of Destiny. “The Theory Of Magic”. In: *University of Theoretical Magic Press* (32ADR).
- [2] F. Foundson. “To Infinity and Beyond: Fatal Flaws in the Existing Theory of Magic”. In: *Theoretical Magic in Practical* (36ADR).
- [3] The Morrigan’s Champion The Gorilla of Destiny Clarissa Cavendish. “Arcane Spectroscopy”. In: *Astronomy and Astro-arcany* (34ADR).