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How many haters can Brandon block?

Louisa Perry

The Centre for Interdisciplinary Science, University of Leicester

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Abstract

Vine artist Brandon Bowen has publicised his invention for a device that blocks out haters. The paper investigates the extent to which this 'hater blocker' can block haters by looking at the estimated light absorbance of the material. It is conjectured that the spoons, that the device is made up of, is polyethylene with an absorption coefficient of 103.85 cm^{-1} and an average thickness of 1.12 mm. It is calculated that the hater blocking device would be able to block 99.99% of haters but it has design faults which may hinder this value. Limitations in the amount of information known about the spoon's material properties impact the reliability and accuracy of the determined value.

Introduction

Haters are a common problem in many of our lives. Brandon Bowen, a highly respected Vine artist, has come up with the ingenious invention of using disposable plastic spoons to block them [1]. A question to those of us who are interested in applying them to our own lives is the extent to which they can block the haters out. This paper investigates that very question.

Figure 1 – Brandon blocking out the haters [1].

Methods

This paper models the amount of haters lost by the amount of light absorbed by the spoons. As light passes through a material the light, as demonstrated in figure 2 below, is partially but not always fully absorbed.

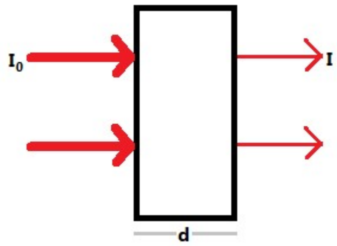

Figure 2 – The intensity of light (I) that can pass through a material of thickness (d) from an incident source of intensity (I_0). Adapted from [2].

To calculate the intensity of light I that passes through a material of thickness d from an initial light intensity, I_0, the following equation can be used [2]:

$$I_0 = Ie^{-d\alpha}. \quad (1)$$

The absorption coefficient α is the ability for a material to absorb light and is dependent on the specific material. The reduction in haters will be modelled to be equivalent to the amount of light that is absorbed by the utensil invention with an estimated value of α.

Results

Using the intensity equation (equation 1), the ratio of initial intensity I_0 to final intensity I can be found:

$$\frac{I_0}{I} = e^{-d\alpha}. \quad (2)$$

The percentage difference can then be calculated, and therefore the parentage loss of light, when it passes through the spoon. The loss in light is equivalent to the loss in haters seen by Brandon through his hater blocking spoons. The values needed to calculate intensity ratio is the spoon thickness d and the absorption coefficient for the plastic α.

Plastic spoons tend to be made out of either polyethylene or polystyrene [3]. Documented values of a disposable spoon's thickness could not be found so a micrometre was used to measure 3 different disposable utensils (see Appendix). The average thickness of the plastic was found to be 1.12 ± 0.40 mm.

The measured absorption coefficient α for polyethylene (measured at a range of 450-725 nm) is 103.85 cm^{-1} [4]. The value for polystyrene could not be obtained due to a wide range of variability for the material. Therefore, Brandon's spoons are modelled as polyethylene.

Assuming the plastic is polyethylene with an α equal to 103.85 cm^{-1} and with a thickness of d of 1.12 mm, the ratio of the intensity of light transmitted and the amount absorbed/reflected is 8.88×10^{-6}. This means that 99.99 % of the light is absorbed (with a negligible error) by the spoon and thus the same amount of haters is blocked.

Discussion

The results show that Brandon's hater blocking device is very effective with a blockage index of 99.99 %. This value, however, is for the spoons alone and doesn't include light going through gaps around the spoon. Further product development would be required to eliminate this.

As the result is a percentage, the amount of haters blocked is dependent on the initial light intensity, i.e. the brighter the light that is reflected by the hater means more hater is blocked, but also more hater is seen. Whilst this model involves the entire incident light, the value given is a percentage and therefore proportionally the amount of decreased hater is the same.

This is modelled on the thickness of the plastic spoon to be consistent whereas in reality it may alter across different points of the spoon. A thicker area would lead to a higher amount of light (and therefore haters) blocked.

The largest limitation is the lack of knowledge of the specific properties of the spoons. The exact plastic used may not be the same polyethylene used in source [4] and polyethylene, as all plastics can, comes in different forms and can be treated in different ways. Additionally, the colour would also affect the amount of absorbance; white plastic has a relatively low absorbance compared to other colours but a more translucent or clear plastic could have a significantly lower absorbance and thus a higher value of I. It also assumes that α is linear to the thickness of the material. The source states that the value remains constant across the wavelengths in the visible spectrum, therefore the colour of the light should not affect the value calculated.

Conclusion

As a hater blocking device, the hater blockage by the spoons is very effective at 99.99 %. Whilst effective for the majority of hater blockage, further product development should be looked at to increase the hater blockage by eliminating light that can be accessed by the gaps surrounding the device.

References

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Appendix

Estimated spoon thickness

A micrometre was used to measure the thickness of three different pieces of disposable cutlery (at different points on the tool end of the utensil). The items used were limited to item availability.

Item 1: Clear plastic disposable spoon

Measurement 1	1.04 mm
Measurement 2	1.15 mm
Measurement 3	1.10 mm
Measurement 4	1.05 mm

Item 2: White plastic 5 mL medicine spoon

Measurement 1	1.31 mm
Measurement 2	1.51 mm
Measurement 3	1.27 mm
Measurement 4	1.44 mm
Measurement 5	1.30 mm

Item 1: White plastic disposable fork

Measurement 1	0.72 mm
Measurement 2	0.78 mm

Median thickness = 1.12 ± 0.40 mm