The Dodocahedron and Other Poly-fill-hedra

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Abstract

Puns are a good way to introduce complicated concepts in a non-intimidating manner. In this paper, we share a series of visual math puns created using stuffed animals. The resulting sculptural poly-fill-hedra are both attractive art pieces and entertaining math puns.

Background

Punning is a form of humor that has presumably been around as long as language has. Mathematical jokes and puns are an effective way to add humor and thus allay mathematical anxiety [2]. Humor has also been found to improve comprehension and long-term retention of mathematical concepts [3].

Puns are inherently language-based and thus usually only make sense in the language for which they were originally written. The puns referenced in this paper are all English language puns. The author has no knowledge of whether any of these puns translate reasonably to other languages, but it should be assumed that they do not carry the same humor to non-English speakers.

Previous Work

Mathematical puns are abundant, however it is more unusual to find them in a visual or physical form. Some notable examples of visual math puns include the snowdecahedron [1], as well as a variety of works from Vi Hart, such as the Borromean Onion Rings and the Hexaflexamexagon [7, 5, 6].

The author first created a mathematical polyhedron pun in 2014, when they took 12 parrot figurines and arranged them into a pyritohedral (or, perhaps, “pirate”-ohedral) "Parrotohedron" form [9]. Other physical math puns created by the author include the hyperbolic airplane skirt (joint project with Vi Hart) [8], created from pentagons of airplane fabric, and the Brunnian shortbraid (joint work with Vi Hart and Gwen Fisher) [10].

Surprisingly, the author was unable to find any evidence of prior work arranging dodos into dodocahedra. However, it appears that a variant of this pun was once included in a Simpsons comic story, where a 12-faced man was described as having every face look “stupid” [4].

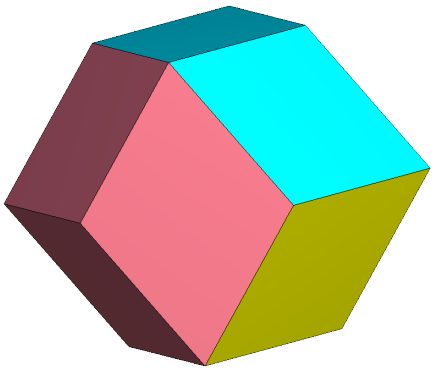
Poly-fill-hedra[1]

The current work comprises a series of animal-based polyhedra puns realized in stuffed animals. These poly-fill-hedra are hand assembled from store bought stuffed animals using needle and thread into visually pleasing forms.

As stuffed animals do not tend to have the same symmetries as polygons, the author was forced to make some design decisions for the poly-fill-hedra. First, the number of animals used should be equivalent to the number of faces in the polyhedra being punned. So, a dodocahedron should be made of 12 dodos and an otterhedron should be made of 8 otters. This was felt to be of eminent importance because the part of the polyhedron names being punned is the part indicating number of faces.

[1]The stuffing of stuffed animals is commonly made of polyester, and is colloquially referred to as poly-fill

Figure 1: *The parrotohedron (left) and hyperbolic airplane skirt (right) that began the author's interest in visual math art puns.*



Rhombic Dodecahedron ©Tomruen, CC BY-SA 4.0

Figure 2: *The dodocahedron (left) is made from 12 stuffed dodos arranged into a roughly rhombic dodecahedral shape (right).*

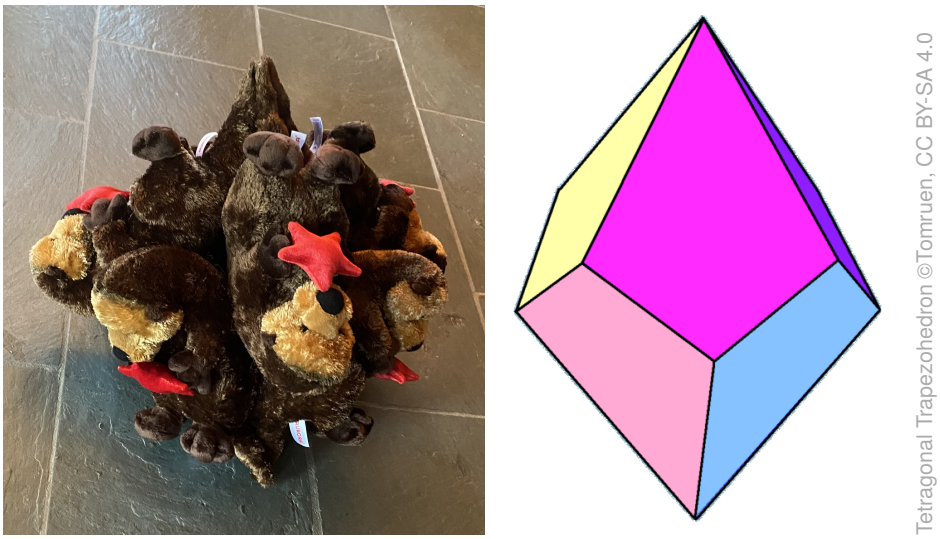


Figure 3: *The otterhedron (left) is made from 8 stuffed otters arranged like a tetragonal trapezohedron (right).*

Figure 4: *For the neon tetrahedron (bottom), stuffed sharks were tetransformed into stuffed tetra (top left). The resulting neon tetrahedron resembles the traditional weapon known as a caltrops (top right).*

Second, the arrangement of the stuffies was chosen to favor more pleasing aesthetic arrangements over having the resulting shape have the same symmetry group as the regular polyhedron of the parallel name. Thus the arrangement of the dodos in the dodocahedron results in a rhombic dodecahedral or pyritohedral shape than a regular dodecahedron, while the arrangement of otters in the otterhedron is more in line with a tetragonal trapezohedron than a regular octahedron.

Finally, the author was not always able to find the "perfect" stuffed animal for each pun. So the neon tetrahedron is made from shark stuffies that were cut, sewn, and colored to resemble neon tetra. Perhaps fittingly for this predatory origin, the neon tetrahedron greatly resembles a caltrops and could presumably be used as an area denial weapon. The auktahedron is made from stuffed puffins (a member of the auk genus) rather than from great auks (an extinct bird apparently less popular than dodos).

Conclusions

The author hopes that these math puns help inspire an interest and understanding of mathematics and generally help make math fun. Puns are frequently treated as frivolous and superficial. Canonically, one "groans" at puns. The author hopes that seeing these poly-fill-hedra will inspire other people to act on and share their own puns, with the understanding that puns can be both an art form and a way to introduce familiarity and levity to subjects that may otherwise be uncomfortable.

References

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