

## Merton M. Hasse Award

### David Treeby

“Further Thoughts on a Paradoxical Tower,” *The American Mathematical Monthly*, 125:1, 44–60, 10.1080/00029890.2018.1390375.

David Treeby’s article “Further Thoughts on a Paradoxical Tower” exemplifies the way a simple inquiry can prompt far-reaching mathematical exploration. The article begins with an appealing, tactile problem: how can one stack a set of blocks on a table so that the horizontal overhang extends as far as possible? If the blocks are of different widths, does the order matter? Should each block protrude further than the block below it, or should the uppermost blocks be used as a counterbalance? Treeby provides elegant, general answers to these questions. The discussion ranges from classical facts about sequences and series to open problems about complexity of computation. Throughout, the paper is illustrated with simple, informative, and compelling diagrams.

### Response

That block stacking papers appear in MAA journals so frequently is notable; perhaps it reflects the fact that the mathematician is best served by retaining their playfulness; the tactile play of the child should simply be translated into more abstract forms of tinkering. My interest in this particular topic stemmed from an elegant solution to a classic block stacking problem written by my PhD supervisor, Burkard Polster, in his delightful little book titled *Q.E.D.: Beauty in Mathematical Proof*. Polster details how one can stack  $n$  blocks of width 2 in a one-on-one fashion to achieve an overhang equal to the  $n$ th harmonic number. Although the classic problem had already been extended in various directions, there was still a wealth of fascinating questions to be explored. My favorite discovery was that of infinite sets of blocks whose widths tend to zero that can nonetheless be stacked to achieve an arbitrarily large overhang. However, my article details many unsolved problems whose solutions were beyond the reach of my abilities. For instance, how should one maximally stack a set of blocks of whose widths are consecutive integers? My approach works for only small sets of such blocks. Readers are invited to pick up a conceptual set of blocks and add to my incomplete tower.

### Biographical Sketch

David Treeby received his PhD from Monash University, Melbourne, in 2018, where he worked under Burkard Polster, Marty Ross and Heiko Dietrich. Each of these teachers imparted the lesson that mathematical ideas deserve to be beautifully presented, whether cast in words, equations or images. David completed his studies while teaching high school mathematics at Presbyterian Ladies’ College. Here, he confuses his students by using words such as “elegant” and “mathematics” in close proximity.