Qeios

Peer Review

Review of: "Visualizing Generalizations of the Pythagorean Theorem"

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1. General Assessment

This is an engaging and well-illustrated paper that explores visual proofs for several generalizations of the Pythagorean Theorem, including the Notrott–Ebisui Fivefold Theorem and the Four Hinged Squares Theorem. The manuscript stands out for its accessible narrative, its use of geometric insight over algebraic formalism, and its clear intent to bridge mathematical rigor with visual intuition.

The author brings together historical context, mathematical developments, and visual reasoning in a compelling way. The integration of geometric diagrams (referenced though not all shown) with commentary offers readers a novel perspective on classical and modern results.

However, there are a few areas where the manuscript could be strengthened, particularly in its clarity, structure, and academic rigor.

2. Major Comments

(a) Structure and Clarity of Visual Arguments

While the paper introduces and references several figures (Figures 1–8), the narrative often depends heavily on them for the reader's understanding. Without immediate access to these visuals or more detailed verbal explanations, the logic may be difficult to follow for some readers.

Suggestion: Where a figure is essential to understanding a proof, describe the visual elements more fully in the text.

(b) Mathematical Rigor vs. Accessibility

The article is intended as a visual and intuitive exploration. However, some parts (especially the proof of the Ebisui–Notrott theorem) could benefit from a clearer step-by-step breakdown of the logic, including

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more explicit geometric identities being used.

Suggestion: Add a short appendix or footnote formalizing one of the visual proofs for readers wanting mathematical precision.

(c) Originality of the Contributions

The manuscript hints that some of the visual approaches might be new (e.g., the windmill-based cosine law proof) but stops short of explicitly claiming novelty.

Suggestion: Clarify whether any of the visual proofs are believed to be original. If uncertain, indicate this transparently (e.g., "to the author's knowledge...").

(d) Literature Context

The references are extensive and diverse, including academic articles, websites, and encyclopedic entries. However, the paper could better distinguish between peer-reviewed sources and informal/educational ones.

Suggestion: Separate formal academic references from informal or online resources, and indicate clearly the level of authority for each.

3. Minor Comments

Typographic and Formatting Issues:

Minor formatting errors (e.g., misplaced characters in the bibliography).

Suggestion: Carefully proofread and clean the final version.

Historical Anecdotes:

The inclusion of historical notes (e.g., Gauss's proposed pine tree demonstration) adds colour but might benefit from clearer sourcing and relevance to the mathematical content.

Suggestion: Either expand slightly to link the anecdote to the theme of visual proof or move it to a dedicated footnote/side note.

Title and Abstract:

The title is informative, but the article lacks a formal abstract summarising its aims, methods, and findings.

Suggestion: Add a structured abstract at the beginning for clarity and indexing.

4. Recommendation

Minor Revision

The paper is suitable for publication after addressing the relatively small issues mentioned above. It offers a unique contribution by emphasising visual reasoning and bringing attention to lesser-known generalisations of a classical theorem. The inclusion of better figure descriptions, improved structure, and more precise source attribution will enhance its clarity and impact.

5. Summary for Editors

A visually rich and historically grounded review article exploring generalizations of the Pythagorean Theorem. It effectively communicates to a broad audience and introduces intriguing connections between historical insights and modern visual mathematics. Minor revisions will improve academic rigor and reader accessibility.

Declarations

Potential competing interests: No potential competing interests to declare.