Strictifying monoidal structure, revisited

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Schauenburg [1] claimed that, on a category of structured sets, any monoidal structure is isomorphic to a strict one. Unfortunately, the proof given was slightly incorrect (due to an issue with the empty set), but it can be adapted to work in two special cases, including many examples of interest. The first case is where the monoidal operation preserves emptiness in each argument; and the second is where it reflects emptiness in each argument. Consequently, on **Set**, every monoidal structure is isomorphic to a strict one. Whether this is the case for $\mathbf{Set}^2$ remains open.

References

[1] Peter Schauenburg. Turning monoidal categories into strict ones. *New York Journal of Mathematics*, 7:257–265, 2001.