Errata of POPL 2021 paper: A Computational Interpretation of Compact Closed Categories: Reversible Programming with Negative and Fractional Types

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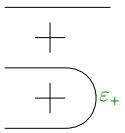
Abstract

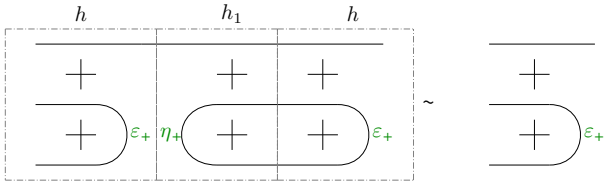
An error in the statement of Thm. 25 was discovered by Cole Comfort. We thank him for pointing it out.

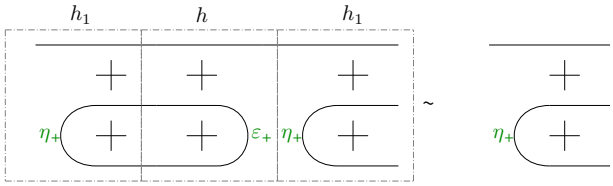
The original statement of Thm. 25 is: "The category $\mathcal{C}$ defined in Thm. 24 is an inverse category." For that conclusion to be justified, it is necessary to prove one additional condition — the uniqueness of inverses — that was missed in the existing proof (and its Agda formalization). Therefore, even though all the arguments in the proof are formalized and verified, they are not sufficient to conclude that $\mathcal{C}$ is an inverse category.
Indeed, we found a counterexample to the claim that $\mathcal{C}$ is an inverse category. Consider $h = \varepsilon_+ \oplus \mathsf{id}\leftrightarrow$:



there are two combinators h_1 and h_2 which satisfy the inverse conditions and $h_1 \not= h_2$:

- $h_1 = \mathsf{id}\leftrightarrow \oplus \eta_+$:





- $h_2 = (\mathsf{id}\leftrightarrow \oplus \eta_+) \fatsemi \mathsf{A{+}[B{+}C]{=}C{+}[B{+}A]}$: