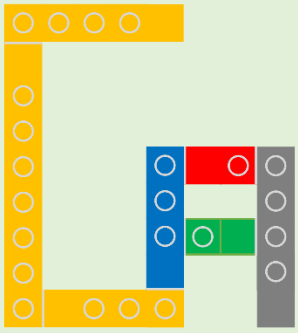
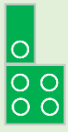


Visual Category Theory

Dmitry Vostokov

rick



y

rick

$\mathbf{CoPart}_{1 \in \mathbf{C}^{op}}$

Visual Category Theory, CoPart 1: A Dual to Brick by Brick, Part 1

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Preface

After publishing some parts of the Visual Category Theory Brick by Brick series (there are 7 of them at the time of this writing with more than 110 pages with brick diagrams), I got suggestions from readers to include standard category language diagrams. Because the original series translated abstract categorical concepts into the language of LEGO® bricks, I realized that the opposite way of translating brick constructions to the standard diagram language of category theory would benefit comprehension of some definitions.

Since usual categorical diagrams are black and white and occupy less space on paper, I also decided to include additional color-enhanced diagrams in the spirit of brick constructions when arrow source and target parts use different colors.

The series itself became a reference dictionary (at least for the author), with more than 70 definitions, so I believe these dual parts make perfect sense for learning. The main reason I created this series was to teach myself category theory beyond superficial textbook reading.

In these CoParts from CoSeries (named after opposite categories with reversed arrows), I keep the same 1-to-1 page correspondence between Parts and CoParts. Page layout is similar: location of explanatory notes (written using standard mathematical notation) is the same – only bricks are replaced by letters, dots, and arrows. Color-enhanced diagrams may also use additional symbols. Therefore, this CoSeries can be used independently from the original series.

A category $\mathcal{C}$ consists of two collections

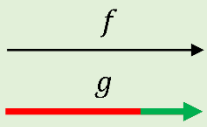
X Y Z

any unnamed object: •

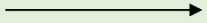
$Ob(\mathcal{C})$ - a collection of objects

X Y Z

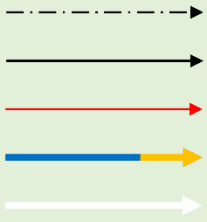
unnamed distinct objects:



any unnamed arrow:



unnamed distinct arrows:



$\mathrm{Ar}(\mathcal{C})$ - a collection of arrows (also called morphisms)