

Visualizing Geometric Morphisms

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Different people have different ways of remembering theorems. A person with a very visual mind may remember a theorem in Category Theory mainly by the shape of a diagram and the order in which its objects are constructed. For such a person most books on Category Theory feel as if they have lots of missing diagrams, that she has to reconstruct if she wants to understand the subject.

The shape of a categorical diagram remains the same if we specialize it to a particular case — and this means that we can sometimes remember a general diagram, and the theorems associated to it, from the diagram of a particular case.

In this talk we will present the general technique above and one application: reconstructing the statements, and some of the proofs, of two factorizations of geometric morphisms between toposes described in section A4 of [1], from particular cases that are easy to draw explicitly — in which our toposes are of the form $\mathbf{Set}^{\mathbf{A}}$, where \mathbf{A} is a finite category whose objects are certain points of \mathbb{Z}^2 . The tricks for visualizing sheaves on these ‘ $\mathbf{Set}^{\mathbf{A}}$ ’s are described in [2].

References:

[1]: “Sketches of an Elephant: A Topos Theory Compendium”. P.T. Johnstone, Oxford, 2002.

[2]: “Planar Heyting Algebras for Children, 3: Geometric Morphisms”. E. Ochs, 20017. Preprint available at:

<http://angg.twu.net/math-b.html#zhas-for-children-2>.