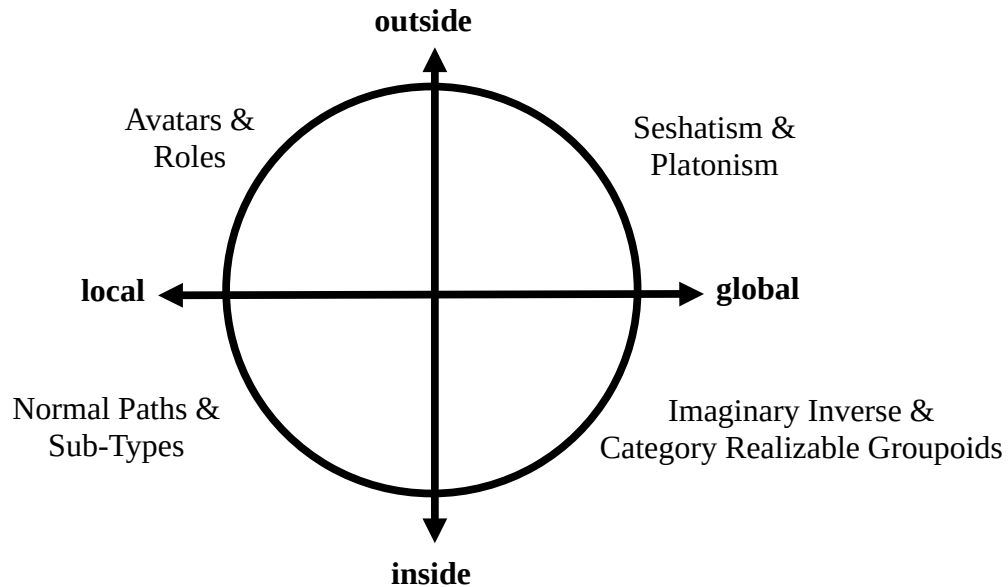


Logi

by William Alexander Morris, Sven Nilsen, 2021

In this paper we represent a simplified overview of our research on mathematical language design.

LOGI or “Logi” stands for Local-Outside-Global-Inside and is a simple diagram:



This diagram summarizes the most important results of the Path Semantics research project.

Each quadrant contains a major topic that is recommended learning about to appreciate the diversity of mathematical language design as a field. Here is an overview of these four topics:

Normal Paths & Sub-Types^{[1][2]}

A normal path is kind of like a commutative square where one edge is “normal computation” and the parallel edge is “path computation”. The orthogonal edges are sub-types of input and output. This is important for e.g. describing behavior of computer programs formally.

Imaginary Inverse & Category Realizable Groupoids^{[3][4]}

An imaginary inverse is like an inverse but does not necessarily evaluate to some solution. It is “imaginary” in the sense that it can be constructed for any function. A category realizable groupoid is when the imaginary inverse is introduced for all morphisms. This is important for composing normal paths even there exists no solution of the parts.

Avatars & Roles^[5]

An avatar is like a new-type that “wraps” an existing type. Roles are types associated with avatars of the same inner type. This is important to formalize theories which are produced by relating symmetries of “smaller” theories.

Seshatism & Platonism^[6]

Platonism has two forms as Loop Witness and Product Witness. Seshatism is the dual of Platonism which denies the Loop Witness and therefore also the Product Witness. Seshatism can be thought of as crediting knowledge by causality, e.g. learning from mistakes. Platonism can be thought of as crediting knowledge by abstraction, e.g. learning from theorem proving.

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