

Strict syntax of type theory via alpha-normalisation

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 - ▶ Substitution laws are definitional
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 - ▶ Low level, ad-hoc choices to make about the implementation
 - ▶ Too long and tedious to define

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- ▶ Implementation: QIIT, initial GAT, initial CwF with extra structure

Transport hell in the syntax

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$$\begin{aligned}\Pi & : (A : \mathsf{Ty} \Gamma) \rightarrow \mathsf{Ty} (\Gamma \triangleright A) \rightarrow \mathsf{Ty} \Gamma \\ \Pi[] & : \Pi A B [\gamma]^T \equiv \Pi (A[\gamma]^T) (B[\gamma^+]^T) \\ \\ \mathsf{lam} & : \mathsf{Tm} (\Gamma \triangleright A) B \rightarrow \mathsf{Tm} \Gamma (\Pi A B) \\ \mathsf{lam}[] & : \mathsf{lam} b [\gamma]^t \equiv \mathsf{lam} (b[\gamma^+]^t)\end{aligned}$$

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Note: Extrinsic formalisation doesn't suffer from transport hell.

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We try to do (iii) without hacking.

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- ▶ Extension to dependent types.