\[ F(z) = g(z)g(z^{-1}) \]
\[ F'(z) = g'(z)g(z^{-1}) - g(z)g'(z^{-1})z^2 \]
\[ (\log F(z))' = \frac{F'}{F} = \frac{g'}{g} - \frac{g'(z^{-1})}{g(z^{-1})}z^2 \]

There is a second Galois theory, proof of the existence of horizontal associators in Drinfeld's \text{Gal}(\overline{\mathbb{Q}}/\mathbb{Q}) paper? In particular, I don't understand the following quote the \text{Gal}(\overline{\mathbb{Q}}/\mathbb{Q}) paper:

If \( M_1(k) \neq \emptyset \), then the sequence

\[ 0 \rightarrow \text{gt}_1(k) \rightarrow \text{gt}(k) \overset{\nu}{\rightarrow} k \rightarrow 0, \quad \nu_\phi(s, \psi) = s, \tag{5.8} \]

is exact, and to every \( \phi \in M_1(k) \) corresponds a splitting, defined by the Lie algebra of the stabilizer of \( \phi \) in \( \text{GT}(k) \).

**Proposition 5.2.** The mapping \( M_1(k) \rightarrow \{ \text{splittings of the sequence (5.8)} \} \) is bijective. In particular, exactness of (5.8) implies that \( M_1(k) \neq \emptyset \).

The double shuffle algebra that Furasho talks about, is it the GRT group of some algebraic structure?

**Question.** Is there a nice diagrammatic space to describe \( R_{1\mathfrak{g}} \), for an arbitrary representation \( R \) of \( \mathfrak{g} \)? It doesn't seem so.
Question: For a semi-simple $g$, what are the finite-dimensional representations of $Ig$?