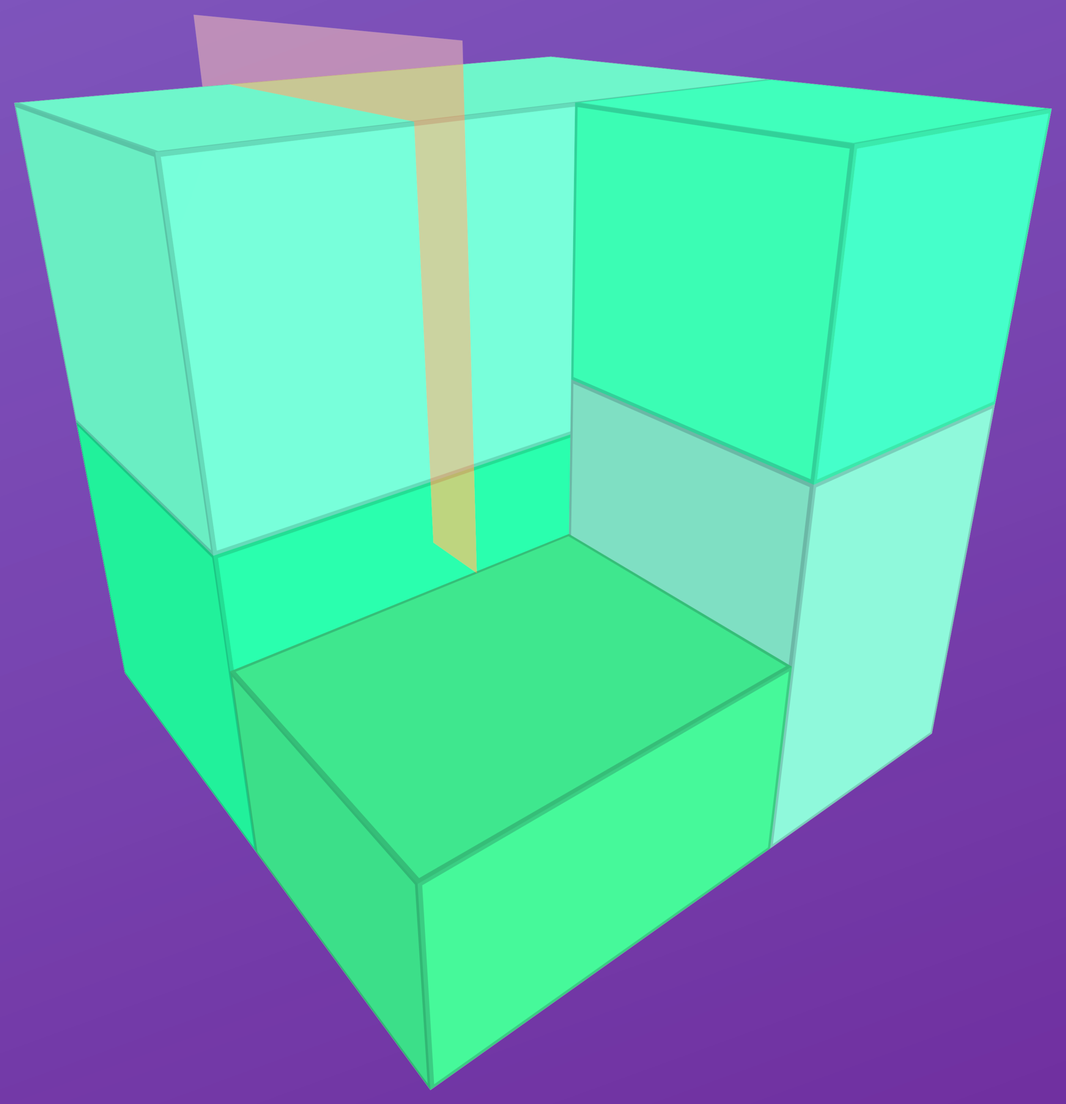
Shape Grammar Editor

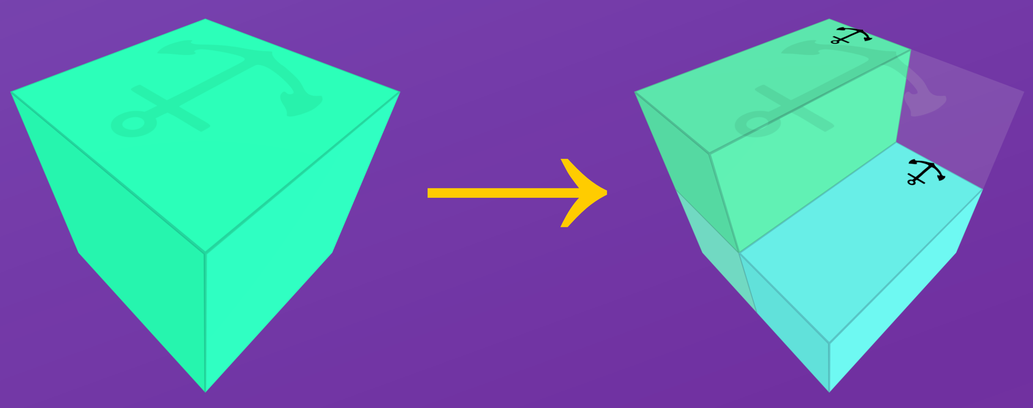
Shape Grammar

A popular **procedural generation** method for 3D volume creation is shape grammar. The rule-based replacement of shapes lends itself to regular structures such as buildings. One type of shape grammar in particular, **split grammar**, is very intuitive and easy to implement. In split grammar, the users are restricted in what kind of rules they can define. It is like **sculpting**; the material is removed until an artwork remains. Any shape can be generated if the initial shape is large enough.



Editor

Unfortunately, very few tools are available that let users define shape grammar rules. The known tools that support grammatical generation are **ArcGIS CityEngine** and **Houdini**. Both only allow the rules to be defined via text. My thesis introduced a new approach to define the rules. In Shape Grammar Editor, users define rules by defining cuts on a 3D shapes via a **3D editor**. No code required.



Grammar Rules

The editor offers multiple **cutting methods** for creating planar cuts on 3D shapes. After a cut is made, the 3D shape is split into two sub-shapes. These sub-shapes can be **erased** (to remove material), assigned a **symbol** (making the production non-terminal), or be **cut** again (to make multi-cut rules). For example, the rule on the left has been cut into four sub-shapes. One of them has been erased, which is indicated by the empty space. Two of them have a symbol assigned to them. These sub-shapes have black **anchors**, which determine the symbol direction. This rule is self-recursive; four generations of using the rule are shown below.

Godot Plugin

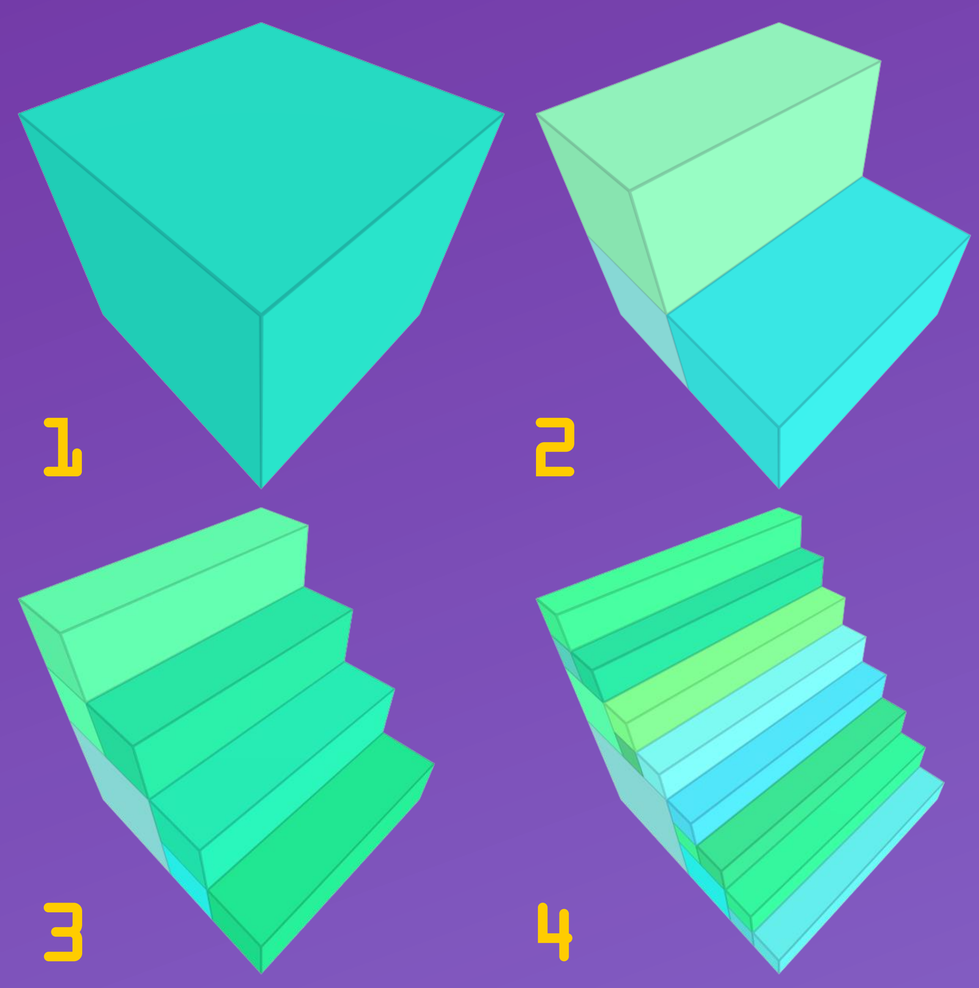
User can either **export** the generated mesh from the editor or they can **save the grammar** into a file. That file can then be used with a Godot plugin to generate meshes in Godot games. This feature is unique, since CityEngine and Houdini only allow the procedural generation in application. The plugin allows the generation to happen during **run-time** of a game. The plugin is available on Godot Asset Library.

https://mathiasplans.itch.io/shape-grammar-editor

Editor

Plugin

https://godotengine.org/asset-library/asset/1871



Try It Out

The editor is available on the web. It is designed for **mouse and keyboard** only. On the application page, there is a link to a **tutorial**. For feedback, contact the author via e-mail or create an issue in GitHub repository.

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Repositories:
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