Shape Grammar

Shape grammar is composed of the rule and the initial shape, what we call as rules can be done with “design operators”; for example transformation (translation, rotation, reflection, and scaling), combination (several Boolean operations), and replacement. Designers can create a composition (a state of the design world) by instantiating, transforming, and combining shapes. I think that one powerful feature of shape grammar is predictive and descriptive power. So you can see design created by shape grammar, you can continue to design in the same way even in other’s work, and you can understand relationship between form and meaning easily.

Shape grammar with design operators is similar to structure grammar in computer science; operator is a kind of function, most computations work on many functions. For example in computer language, C or Visual Basic code has so many functions. In these functions there are the initial value and functions (actually numerical formulas). From that point I think computer can be possible and potential tool in design process with shape grammar.

How can computer help in design process by applying shape grammar? Of course computer can recognize some rules and reproduce products fast with the rule. Besides these activities, what can computer do for designers?

There are two kinds of shape grammar; standard grammar and parametric grammar. Parametric grammar has varied spatial relations. I think if the number of parameter is small, designer can recognize and predict several options of designs, but if the number of parameter is large and spatial relations get to be more complex, people can’t predict many spatial relations and meanings easily. Moreover, in architectural design some novice without training in architecture cannot imagine and express 3D world, even 3D geometry, easily. So I believe that computer’s powerful computation ability can help designer to apply the rules to his/her design.

First, the use of shape grammar can help architectural designers to visualize several options of design in 2D and 3D, and then we can select one of these designs. Then designers can have more powerful tool in design process.

Second, if we create designs according to shape grammar, I think that shape grammar can define the only one style. In my past experience, if we just fix one rule in your design, it may often be boring. To make space more interesting some variations of rules are necessary in design process. Therefore if transforming, combining, and replacing not only objects but also shape grammar is possible, the created design can be more interesting. For example adding or removing some rules to the current rule, combining two or more shape grammars, and taking turns in applying several shape grammars to design.

Shape grammar is very useful way to create shapes and to understand design, but in design process something intuitive or chance must be existed. Design problem and solution process happen interactively by feedback process. Designer examines and analyzes his design, and figure out some solution or new problems and repeat these procedures. But in my opinion shape grammar gets rid of this interactive process from designers.

How can we overcome it? Can computer make us overcome it?