

48-747 Shape Grammars

Spring Semester 6-12 units • MF 11.00-12.20 • MM 415 IW

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Course Website:

<http://www.arc.cmu.edu/users/ramesh/course/48-747/>

(under construction)

To introduce spatial grammars and their applications, primarily to design and composition.

Emphases on the formal and informal aspects of grammars, evolution of grammatical ideas, their relevance, application and use in the analyses of 'styles', synthesis of 'form', and incorporation of 'function', and not least, in teaching grammars to a computer.

Shape grammars, will be examined in detail.

For nearly three decades, grammars have been used extensively to understand styles of architecture, landscape design, fine art and ornament.

course objectives

Course Description

- Introductory course

- A *6 unit* assignment-based course (without prerequisites)

OR

- Extended to a *full semester* with a shape grammar project component (for some this may involve programming)

Fundamental notions of grammars and rewriting systems, languages of grammars

Introduction to shape grammars and their properties

Transformations of grammars

Other kinds of spatial grammars

e.g., structure, solid grammars, graph and color grammars

Application of grammars to aspects of architecture and urban design

Application of grammars to other disciplines

Weights, sorts and augmented spatial grammars

Implementing shape grammars [and other spatial grammars]

Recent trends in grammar research

Other topics suggested by students

course topics

Graduate students will be *evaluated* on the full semester course (worth min. 9 units).

Undergraduate students will be *initially evaluated* for a half-semester course (worth 6 units). Students who score at least C+ at mid-semester may proceed to the full semester course for credit.

The project and any accompanying preparatory assignments will be worth an additional 3 units.

Students may also complete the computational assignment for an additional 3 units. This assignment is required of all Computational Design students.

course credit

Grammar assignments (5 units)
In class participation (1 unit)

First mini

Project + any preparatory assignment (3 units)

Computational assignment (3 units)

Second mini

assignments

**Required of all CD
graduate students**

Reflection of your affinity and flair for the subject matter.

A 90+ B 80+ C 70+

A (excellent) means that you have scored at least B or better in each assignment.

B (good) means that you have at least successfully completed (passed) each assignment.

C means you do not fail the course, and you either you performed uniformly badly, or failed in one of the assignments.

A tendency to mark *hard assignments leniently* and *easy assignments*

grading

Everyone to do well

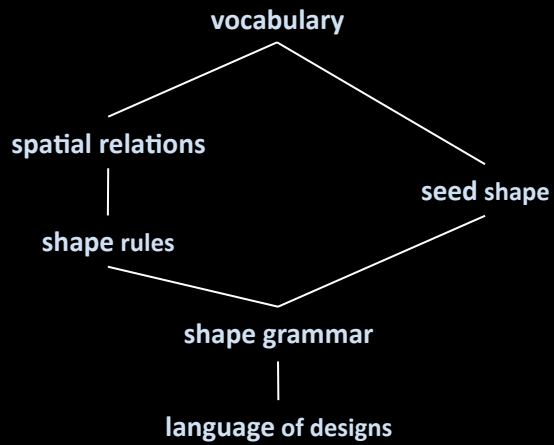
Have a tendency to mark *hard assignments leniently* and *easy assignments hard*.

Written parts for any assignments must be grammatical.

Drawn parts for any assignment must be neat (if you can't freehand neatly, use a computer drawing program).

Programmed parts or algorithms for any assignment must have a clear logic.

expectations



motivated by Frederick Froebel's Kindergarten model of free play and creativity through his gifts

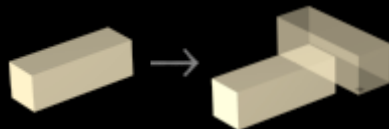
vocabulary
+ spatic



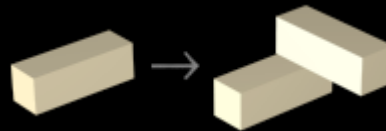
a design



free play



additive shape rule



subtractive shape rule



language



paradigm: child's play

in a shape grammar one can find ...

structure

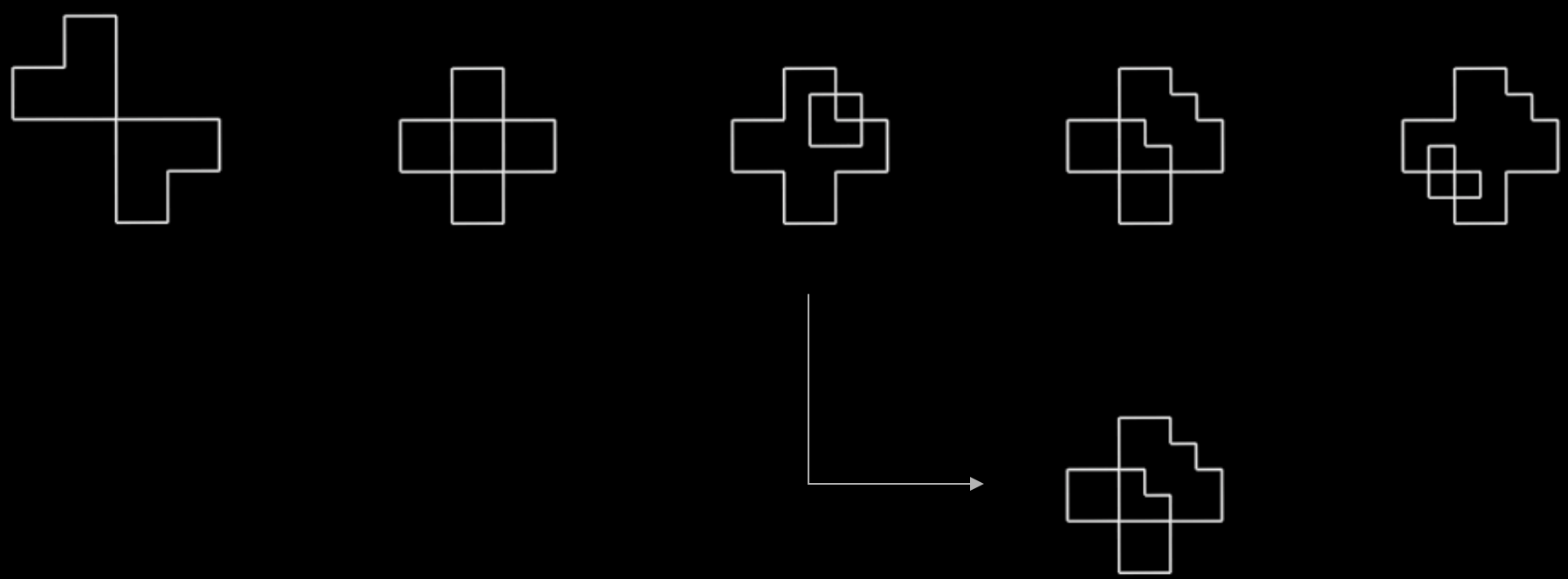
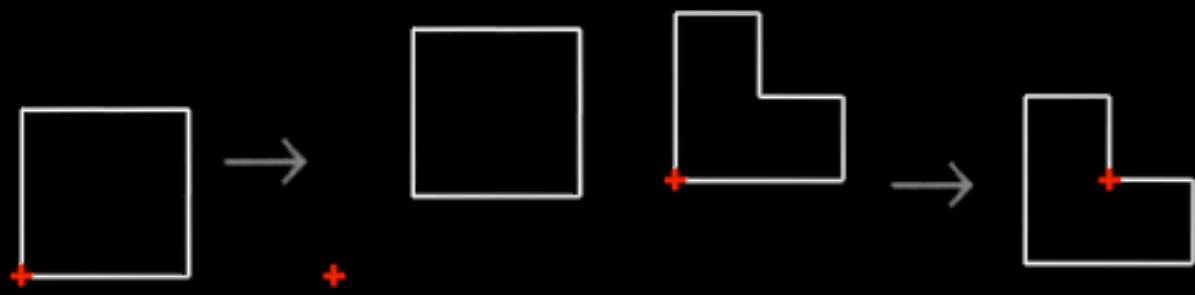
order

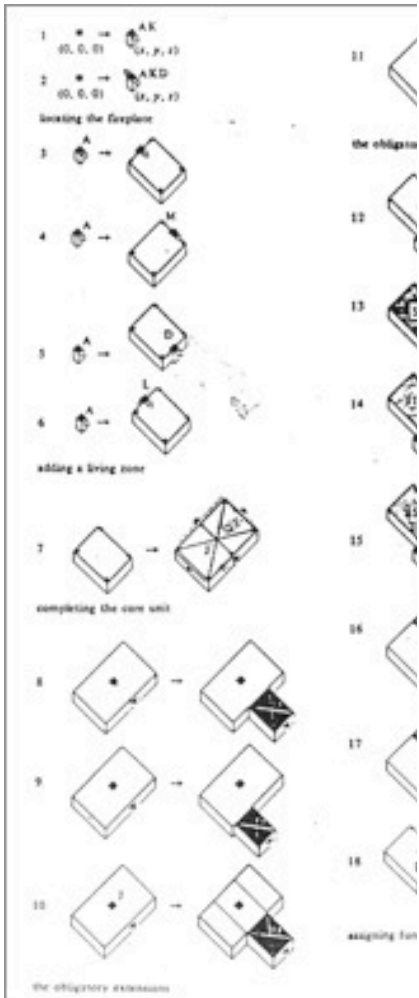
chaos

ambiguity

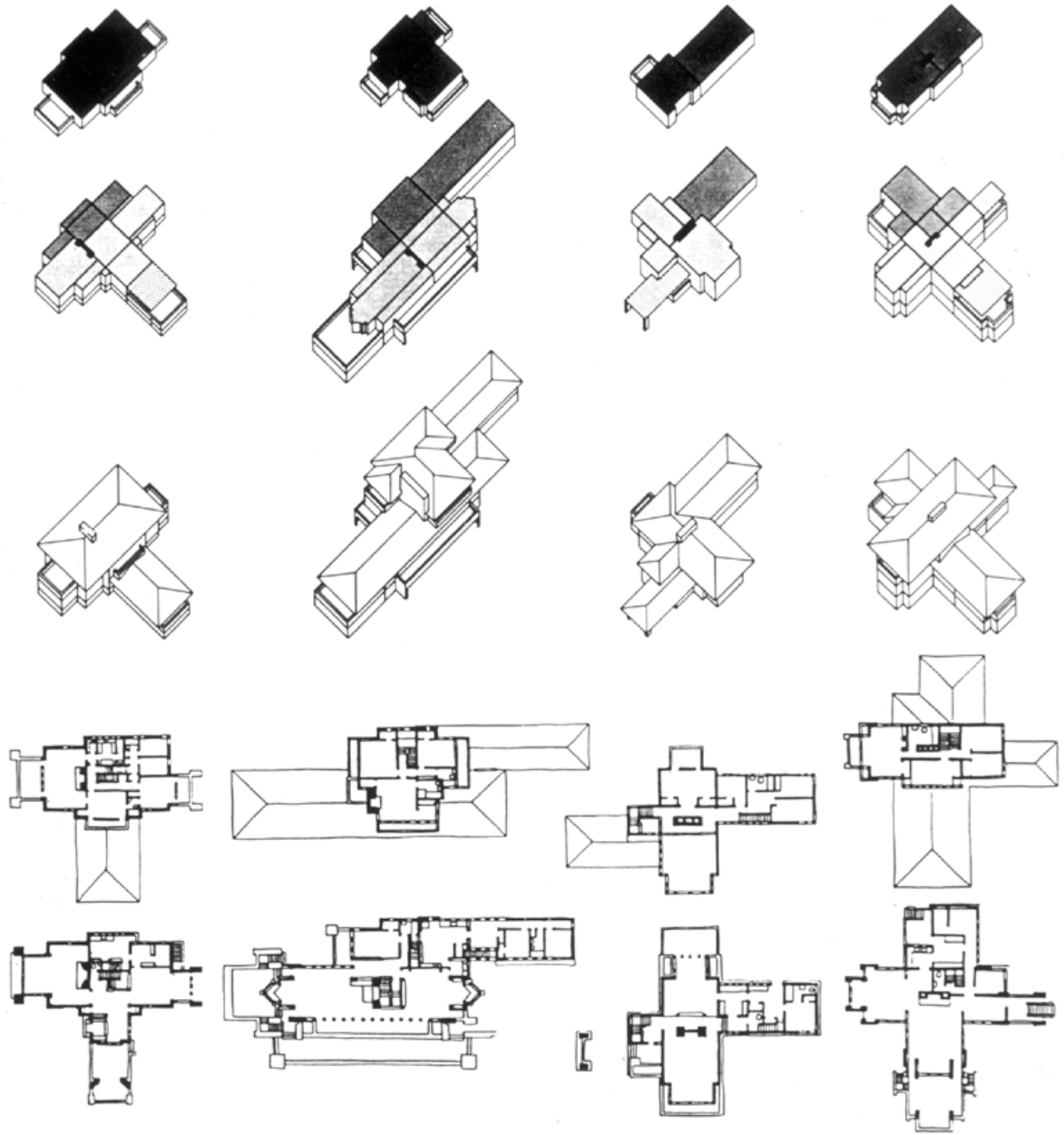
emergence

meaning





prairie houses of fr



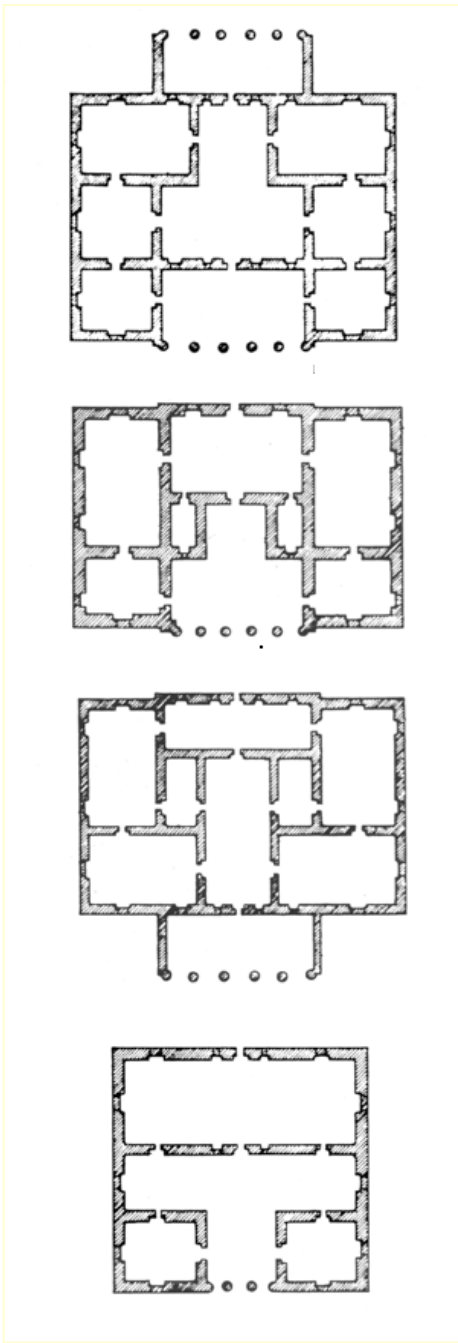
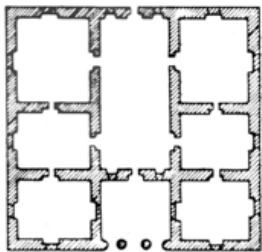
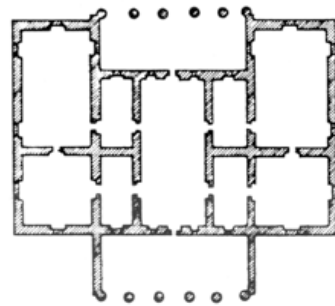
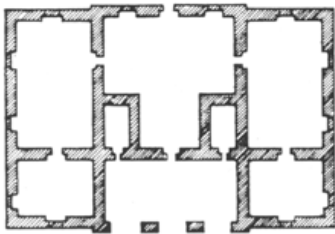
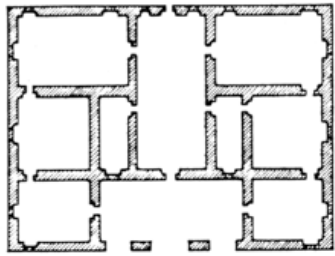
little house

robie house

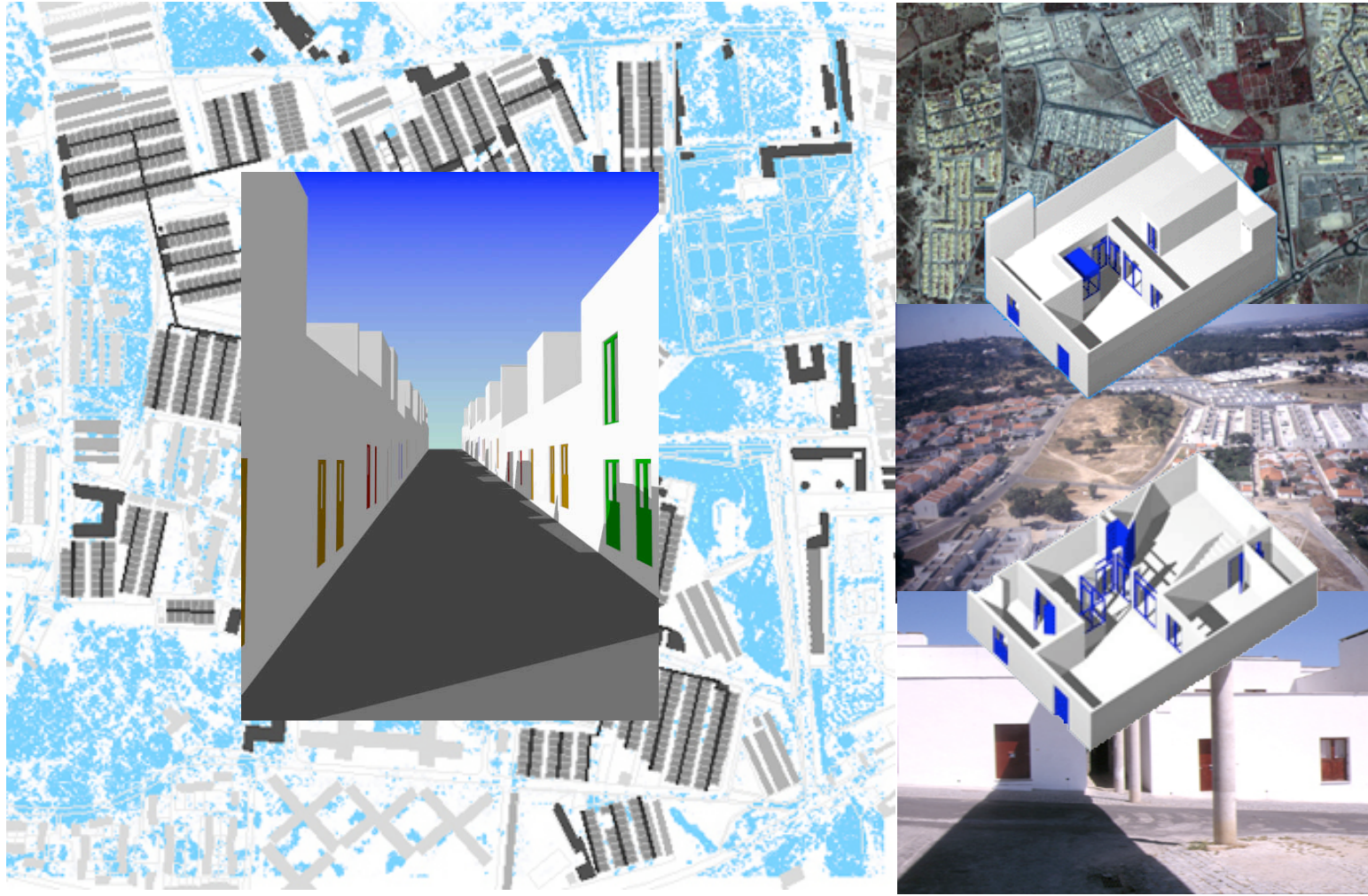
march house

stiny house

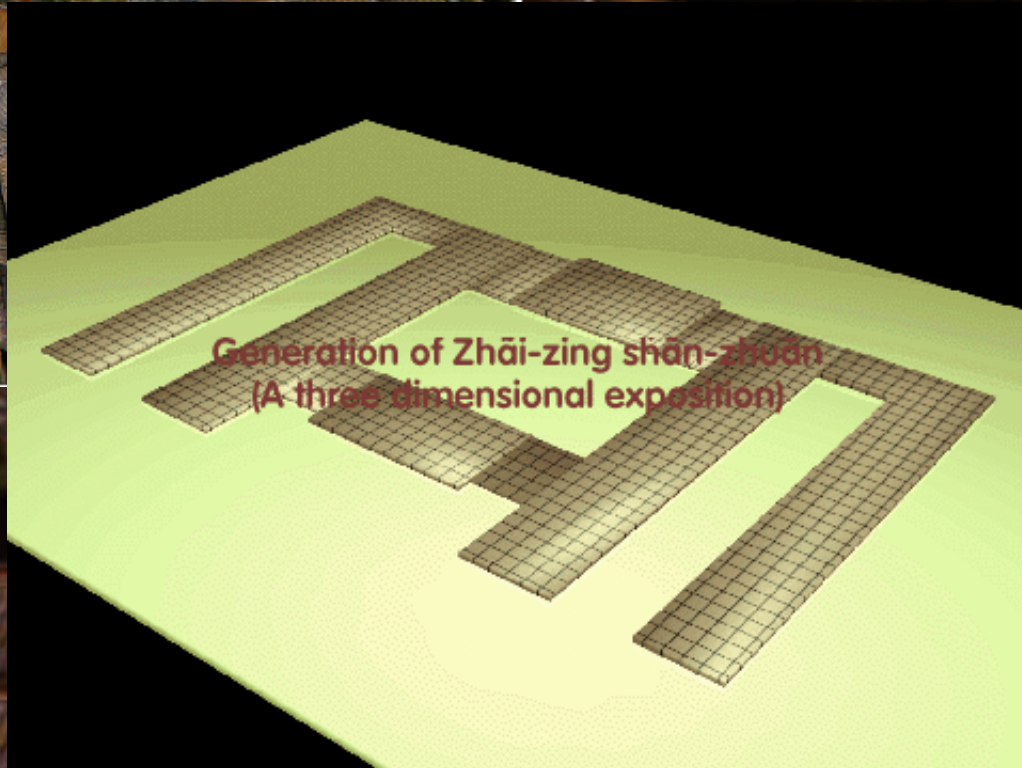
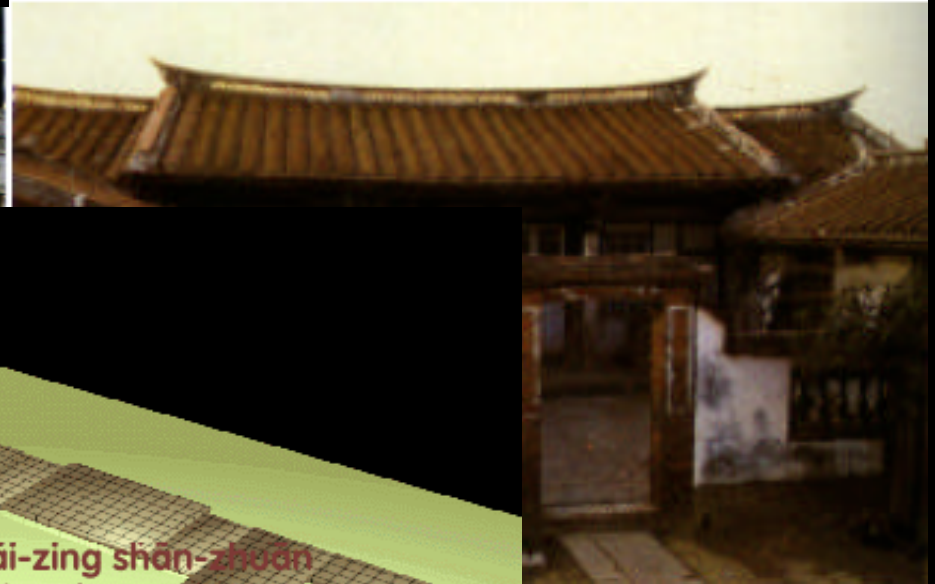
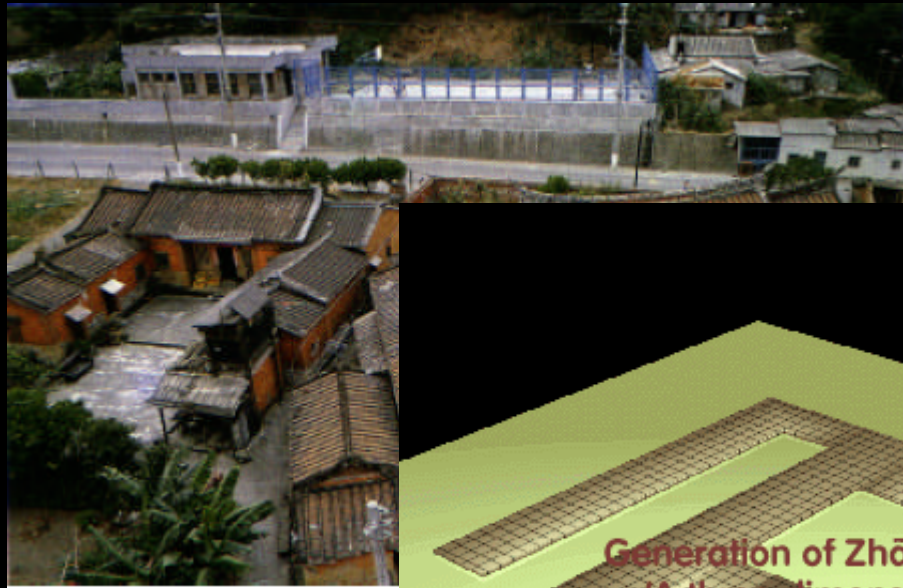
[go to introductory lecture](#)



palladian grammar



malagueira





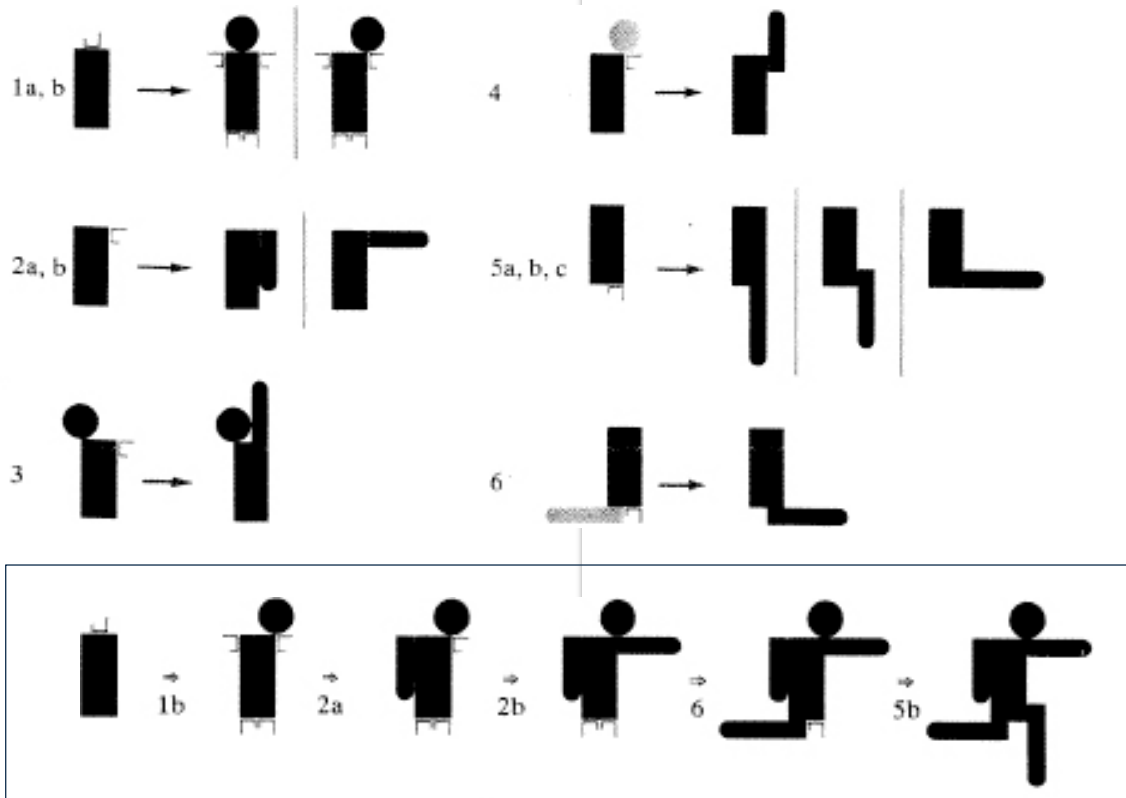
in the computer graphics field

procedural modeling

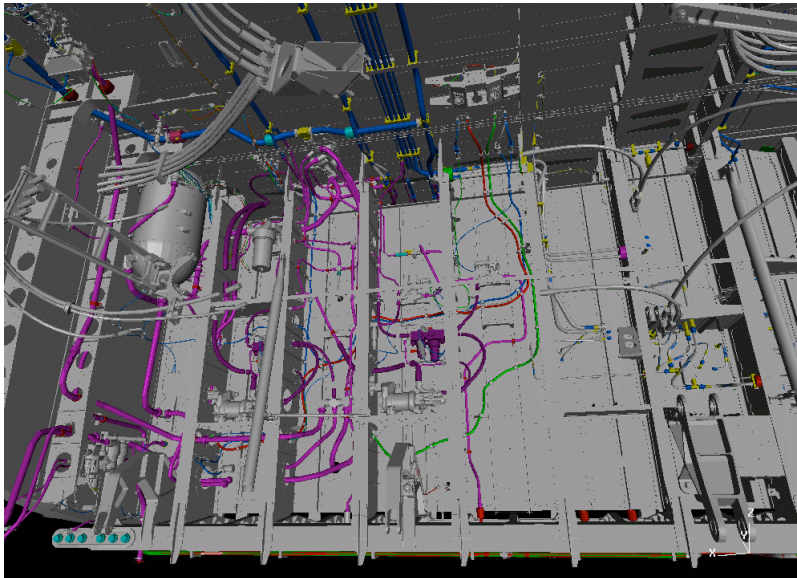




procedural modeling



structures grammar

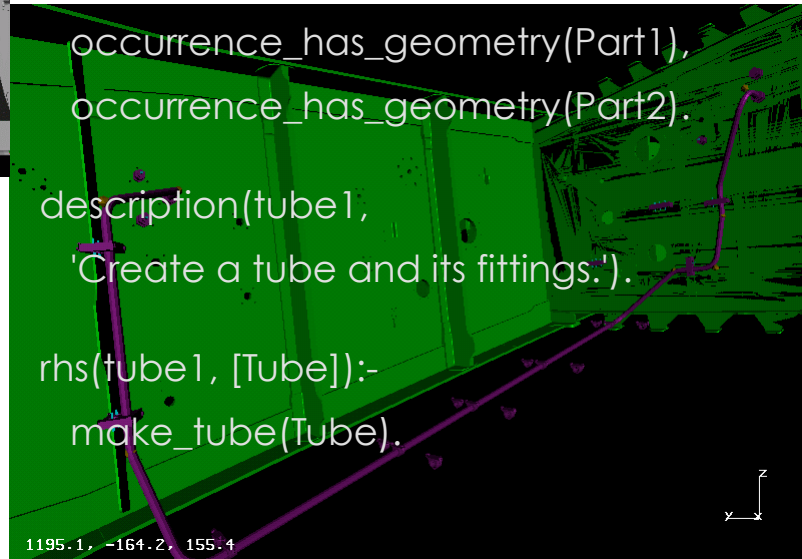


```
condition(tube1,  
  'Tube has no geometry.').
```

```
lhs(tube1, [Tube], [Part1, Part2]):-  
  schematic_tube_connections(Tube, Part1, Part2),  
  in_context(Tube),  
  not occurrence_has_geometry(Tube),  
  occurrence_has_geometry(Part1),  
  occurrence_has_geometry(Part2).
```

```
description(tube1,  
  'Create a tube and its fittings.').
```

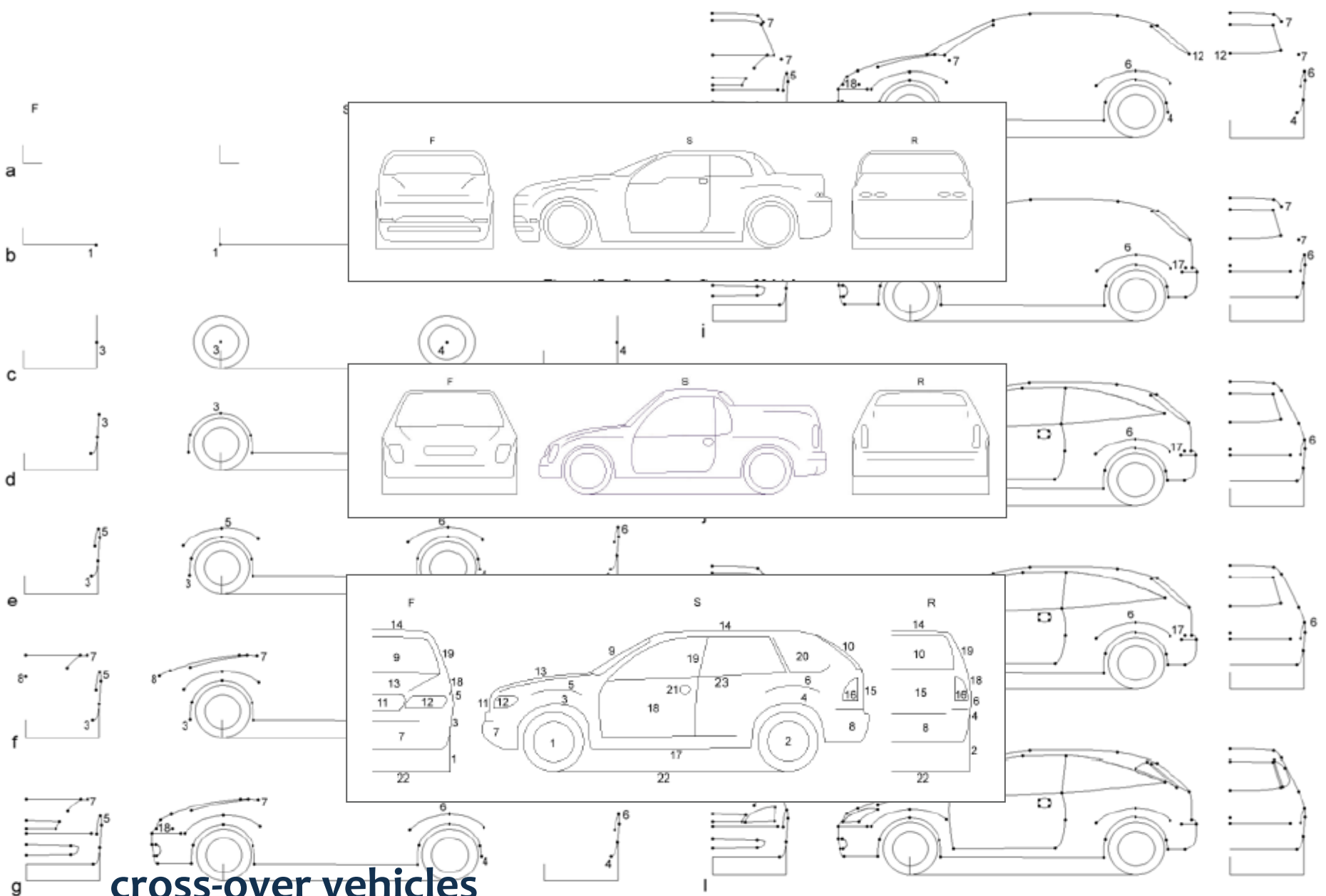
```
rhs(tube1, [Tube]):-  
  make_tube(Tube).
```



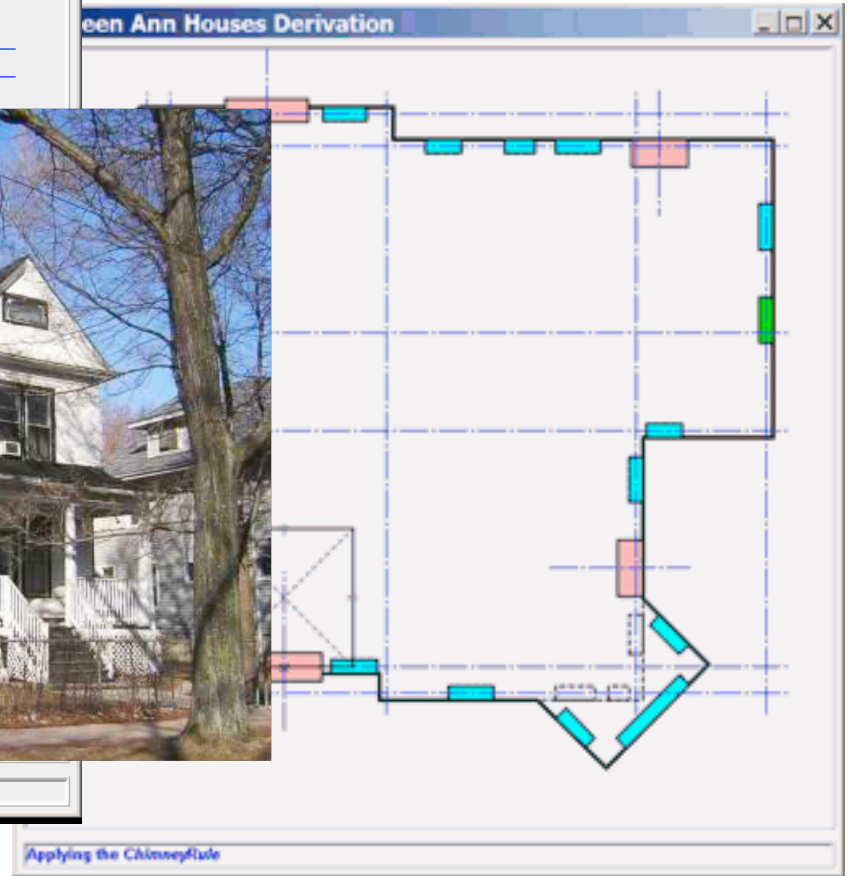
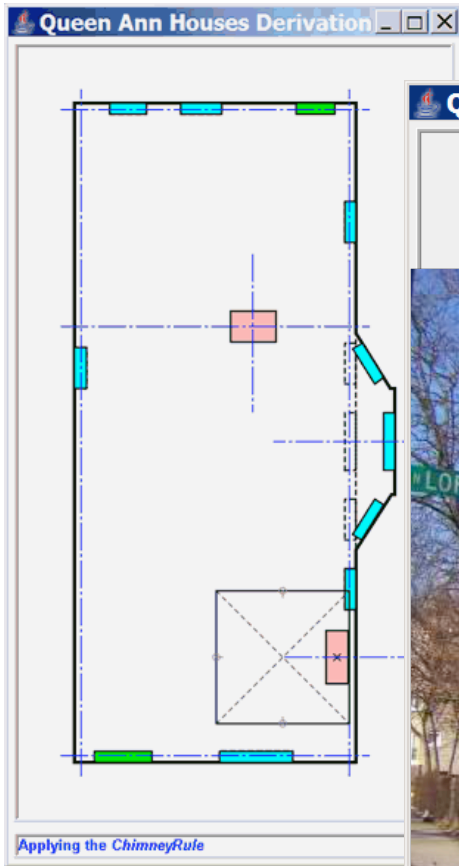
pipng in the landing bay – boeing 777



queen anne houses

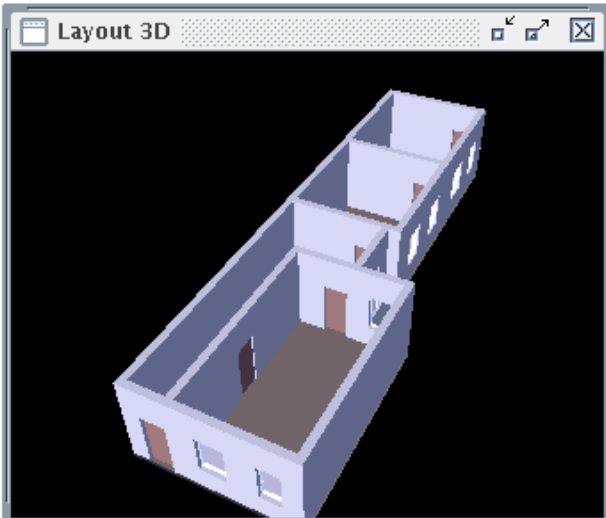
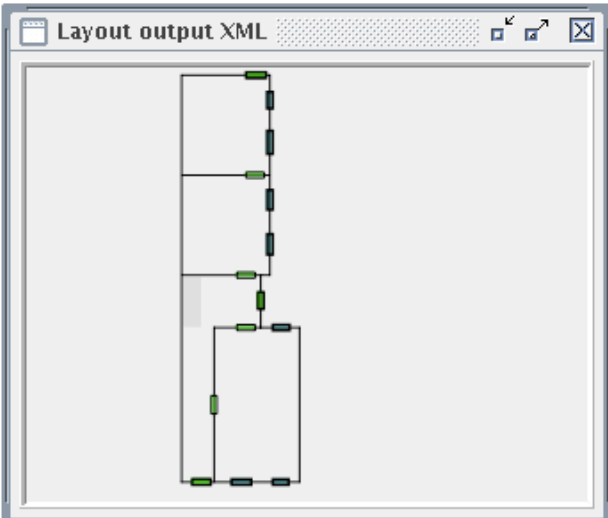
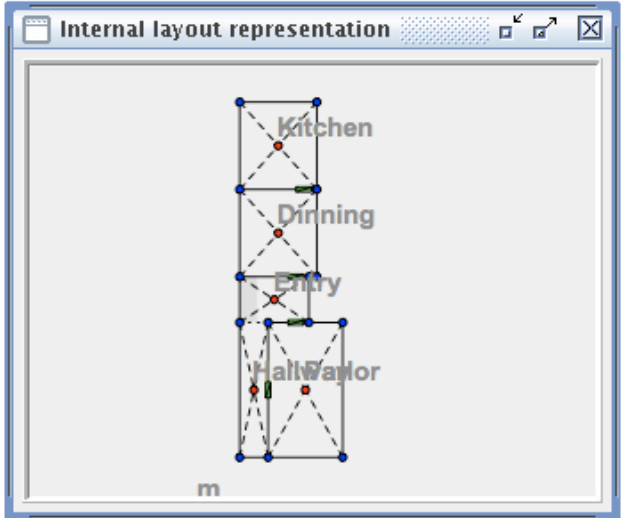
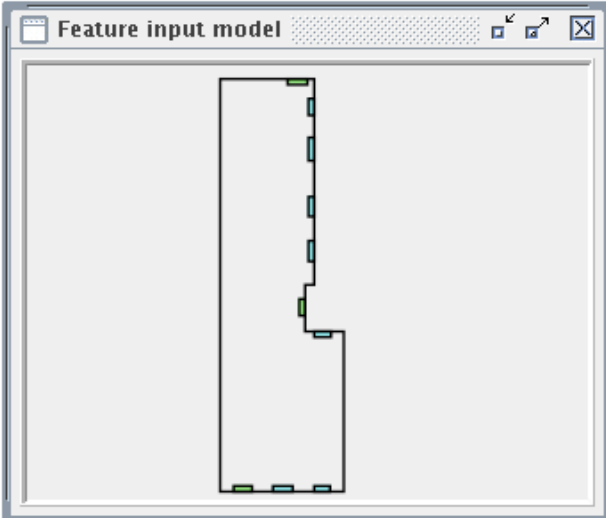
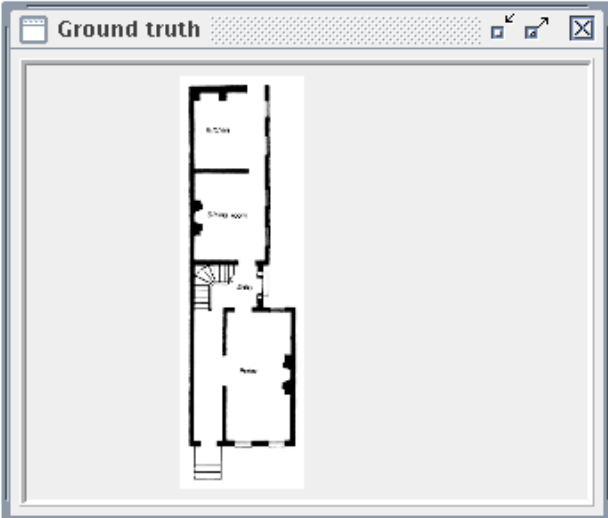


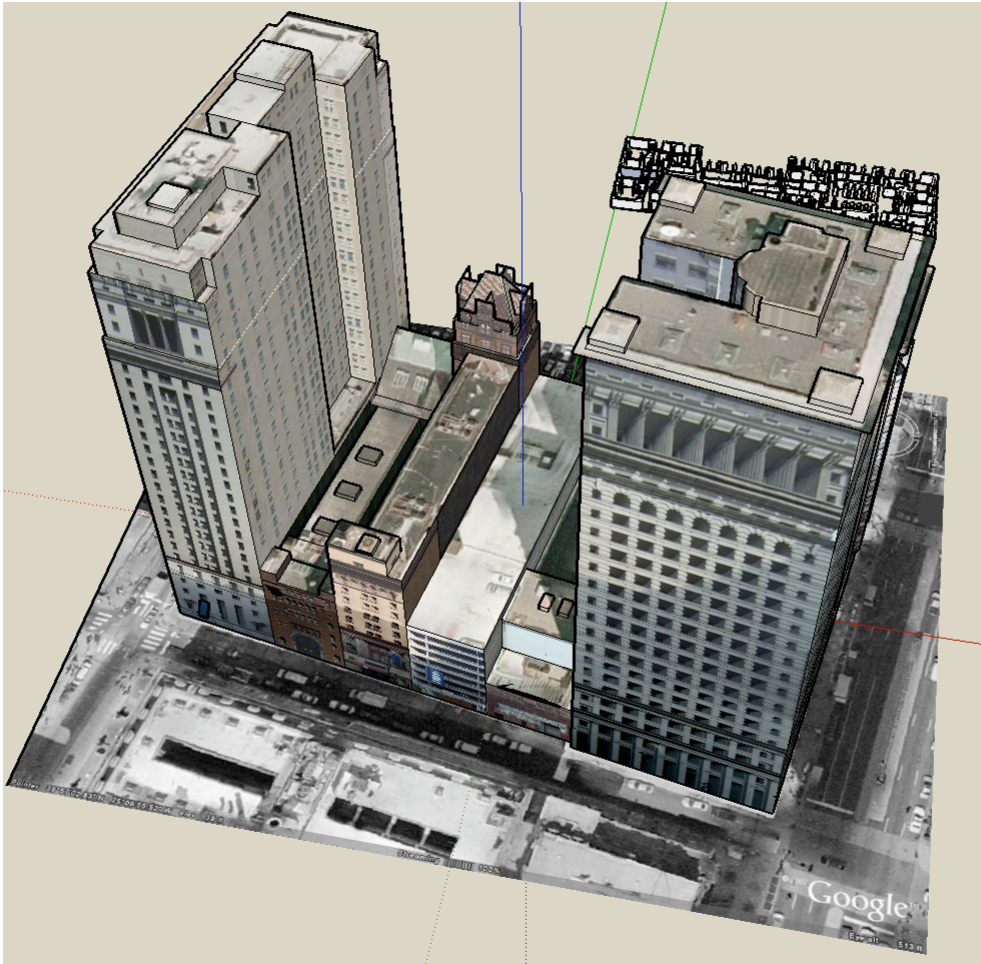
cross-over vehicles





Baltimore rowhouses





**high-rise
apartments**