48-747 Shape Grammars

GRAMMAR OF PRAIRIE HOUSES
“Consistency in grammar is therefore the property – solely – of a well-developed artist-architect. Without that property of the artist-architect not much can be done about your abode as a work of Art. Grammar is no property of the usual owner or occupant of the house. But the man who designs the house must, inevitably speak a consistent thought-language in his designs. It properly may be and should be a language of his own if appropriate. If he has no language, so no grammar, of his own, he must adopt one; he will speak some language or other whether he so chooses or not.”

Frank Lloyd Wright, *The Natural House*, pp 182-83
First –
To reduce the necessary parts of the house and the separate rooms to a minimum, and make all come together as enclosed space ...

Second –
To associate the building as a whole with its site by extension and emphasis of planes parallel to the ground ...

Third –
To eliminate the room as a box and the house as another ...

**organic architecture**
11 prairie houses identified
Superficial features defocused

- Hearth and fireplace
- Function zones
- Living, service and bedroom areas
- Arranged as blocks
Lines used to articulate walls, ceilings, screens between areas

examine a corpora
the corpora: exterior view, bedroom floor plan, main floor plan
the corpora: bedroom floor, main floor, exterior
Little house, 1902
Willets house, 1902
Cheney house, 1904
Little house

Willetts house

Cheney house
“Instead of lean, brick chimneys, bristling up from steep roofs to hint at “judgment” everywhere I can see necessity for one only, a broad generous one, or at most, for two, these kept low down on gently sloping roofs or perhaps flat roofs. The big fireplace below, inside, become now a place for a real fire, justified the great size of this chimney outside. A real fireplace at that time was extraordinary. There were then ‘mantels’ instead. A mantel was a marble frame for a few coals or a piece of wooden furniture with tile stuck in it and a ‘gate’, the whole set slam up against the wall. The ‘mantel’ was an insult to comfort, but the integral fireplace became an important part of the building itself in the houses I was allowed to build out there on the prairie. It refreshed me to see the fire burning deep in the masonry of the house itself.”

defined term: integral fireplace
the fireplace is central
“So I declared the whole lower floor at one room, cutting off the kitchen as a laboratory, putting servants’ sleeping and living quarters next to it, semi-detached, on the same floor, screen various portions in the big room, for certain domestic purposes—like dining or reading, or receiving a formal caller. There were no plans like these in existence at the time and my clients were pushed toward these ideas as helpful to a solution of the vexed servant-problem. Scores of doors disappeared and no end of partition. They liked it, both clients and servants. The house became more free as “space”, and more livable, too. Interior spaciousness began to dawn.”

abolition of rooms per se
convention for lines

double thick line
Rules 1-18

1-2 Locating the fireplace – single or double hearth
3-6 adding a living zone
7 adding a service zone (used once)
8-11 fixes obligatory extension
12-18 assigning function zones
  10-11 aligned with the fireplace on one side
  8,10 aligned with the middle third
  9, 11 positioned to one side

basic composition
Figure 7. Generation of a design. Shape rule schemata are applied to the initial shape to establish a core unit. Numbers under the double-stemmed arrows indicate the schemata applied.

Figure 8. Generation of a design continued: obligatory extensions to the core unit are fixed.

Figure 9. Generation of a design continued: functions are assigned to functionally undistinguished black-toned blocks.

Initial design
tree of generation ≈ the language of prairie houses
Figure 11. Catalogue of basic compositions. The basic compositional form for each house in the corpus is identified. The asterisk indicates that the layout is suitable for double-height living-zone arrangement.
Rules

19-22 Adding to concave corners
23-24 Adding porches
26-34 interior details of the main floor
35-40 basement formation
41-47 Adding terraces
48-53 Exterior details: main floor
54-55 creating portes cocheres

remaining rules – ornamenting the basic composition
Rules

61-62 establishing the bedroom floor
63-64 bedroom floor extension
65-66 bedroom floor details
67-73 making double height living rooms
75-82 establishing roof eave lines
83-84 creating balconies
87-97 roof formation

remaining rules – ornamenting the basic composition
Figure 13. Generation of a design continued: the design is ornamented with blocks in external concave corners, porches, and various interior details.

Figure 14. Generation of a design continued: a basement is specified and a terrace is added.
Figure 15. Generation of a design continued: the bedroom level is added.
Figure 16. Generation of a design continued: the eaves line is established and unused labels are erased.

Figure 17. Generation of a design continued: a balcony is added, the roof is formed, and the chimney is extended. The design is now complete.
Figure 18. Catalogue of the 'simplest' two-storey designs derived from the basic compositions of figure 11. The shading is added for clarity and is not produced by the grammar.

catalog of simplest two storey designs
Figure 19. At least two, and in some cases three, types of designs can be derived from any one basic composition. For example, the basic compositional form (catalogue number 10) shown in (a) may lead to (b) a single-storey design, (c) a double-storey design or, (d), a double-height living-space design.
new designs

Figure 20. Three new designs as generated by the grammar: (a) bedroom level, (b) main floor level, (c) external form; and the detailed plans (d) bedroom floor plan, (e) main floor plan.