Daylight Design and Prediction Techniques

Age Old Adages & Rules-of-Thumb

Age-Old Adages
1. Openings high in the space distribute light deeply

Awful! Vs. Brilliant!

Admin Building Cal Poly Pomona
Predock
Age-Old Adages

2. Workplaces should be close to windows
Age-Old Adages

3. Sidelighting is best for tasks

Woman Ironing
Edgar Degas, 1882

The Milkmaid
Johannes Vermeer, 1661

St. Jerome in his Study
Albert Dürer, 1514

Age-Old Adages

4. Toplighting is best for ambient light

Russian Baroque Cathedral, 1756

Royal Arcade, London
St. Martin-in-the-Field, London

National Building Museum, Wash, DC

The Rookery, Chicago
Alder & Sullivan (Wright)

Ellicott Square, Buffalo, NY
Louis Sullivan
Age-Old Adages
5. Daylight is cool, sunlight is warm

Winter & Summer
Glass House
Johnson

Sunlight
Daylight

Daylighted
Electrically Lighted

Glasgow School of Art
Mackintosh
Age-Old Adages
6. Buildings are light fixtures

Residence
Meier

Kunsthau, Graz
Spacelab Cook-Fournier

British Museum Grand Court
Foster

Daylight
Incandescent Light
Rules-of-Thumb
1. 25% of floor area is maximum skylight area
<< 25%
100%

You can estimate aperture effect:

<table>
<thead>
<tr>
<th>Lighting Type</th>
<th>Average DF</th>
<th>Minimum DF</th>
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</thead>
<tbody>
<tr>
<td>Sidelighting</td>
<td>$0.2(A_g/A_f)$</td>
<td>$0.1(A_g/A_f)$</td>
</tr>
<tr>
<td>Toplighting (Vertical monitors)</td>
<td>$0.2(A_g/A_f)$</td>
<td></td>
</tr>
<tr>
<td>Toplighting (North-Facing sawtooth)</td>
<td>$0.33(A_g/A_f)$</td>
<td></td>
</tr>
<tr>
<td>Toplighting (Horizontal skylights)</td>
<td>$0.5(A_g/A_f)$</td>
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Glare
Contrast greater than 1:3, 1:10, 1:100
By daylight or electric light
Likely causes of glare:

Rules-of-Thumb

2. Avoid glare with apertures in two surfaces
**Rules-of-Thumb**

3. Avoid glare with splayed apertures

Memorial Gym

Mt. Angel Library Aalto

**Rules-of-Thumb**

4. Avoid glare with high IRC

Hill House
Mackintosh

**Glare or no glare?**

University of Chicago
Mansueto Library
Helmut Jahn

Riverside Museum
Glasgow
Zaha Hadid
Rules-of-Thumb

5. Daylight is sufficient @ 2x window height (2h Rule)
Lightshelves reduce light at window and overall, but provide more even light distribution.
Daylighted 121' wide floor plate

Sept 1923

Rules of Thumb

6. Sketching develops intuition

[Images of architectural interiors and sketches]
Design Tools
1. Sketching

Larkin Building
F. L. Wright

Merchandise Mart
Chicago
Final Design Sketch
Booth and Hansen

Figure 3: analytical sketch for the
Chapel St. Ignatius. Steven Holl.

“Bottles of Light”

Figure 7: evaluating sketch: analyzing
the experience of light in space.
Sketch for the Museum of Contem-
porary Art in Helsinki/FIN. Steven
Holl.

Rigorous design tools to follow…