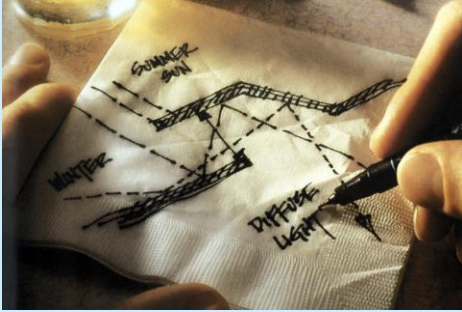


## Daylight Design and Prediction Techniques



Age Old Adages & Rules-of-Thumb

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## Age-Old Adages

1. Openings high in the space distribute light deeply



Phoenix Central Library  
Bruder

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## Awful! Vs. Brilliant!



Admin Building Cal Poly Pomona  
Predock



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# Age-Old Adages

## 2. Workplaces should be close to windows



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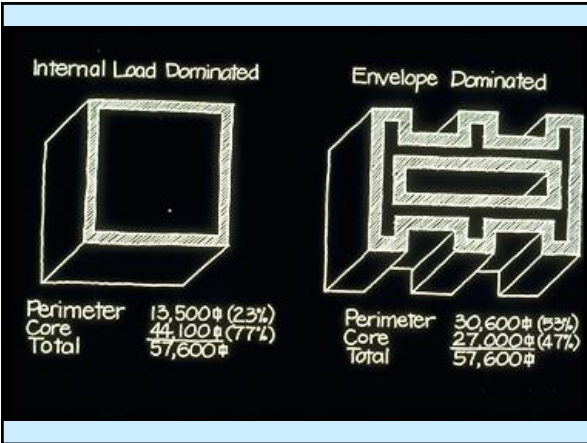
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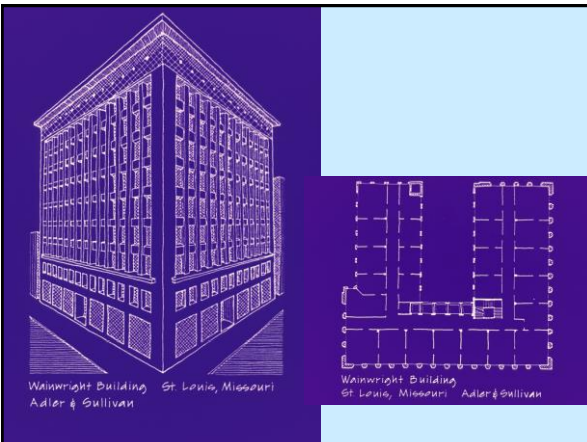
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**Age-Old Adages**  
3. Sidelighting is best for tasks

**Woman Ironing**  
Edgar Degas, 1882

**The Milkmaid**  
Johannes Vermeer, 1661

**St. Jerome in his Study**  
Albert Dürer, 1514

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**Age-Old Adages**  
4. Toplighting is best for ambient light

**Russian Baroque Cathedral, 1750s**

**Royal Arcade, London**

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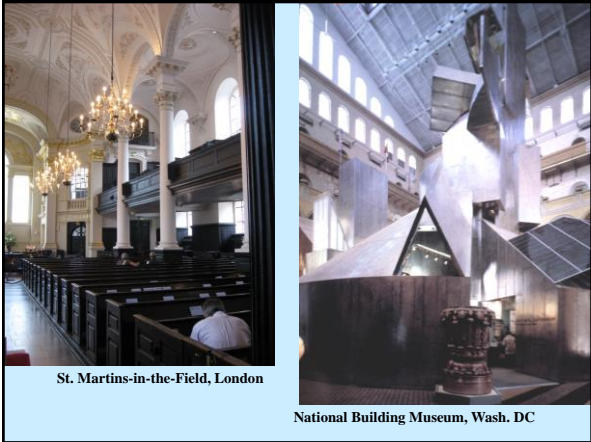
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St. Martins-in-the-Field, London

National Building Museum, Wash. DC

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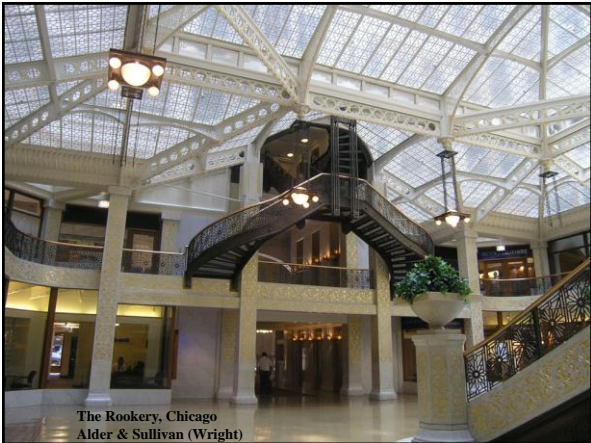
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The Rookery, Chicago  
Alder & Sullivan (Wright)

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Ellicott Square, Buffalo, NY  
Louis Sullivan

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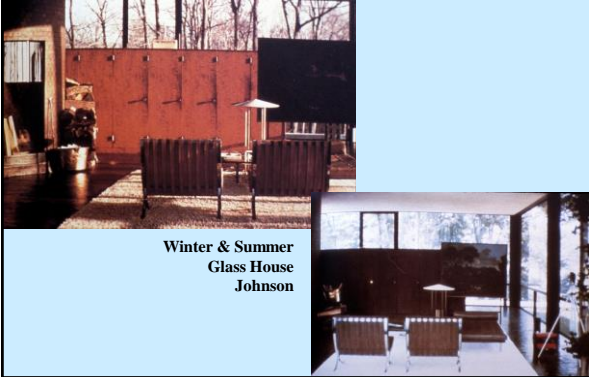
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**Age-Old Adages**

5. Daylight is cool, sunlight is warm



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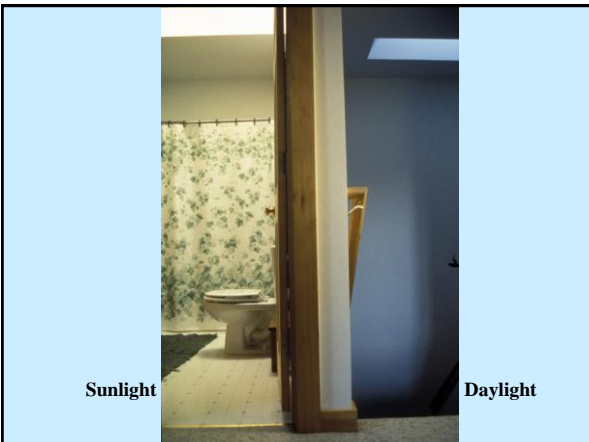
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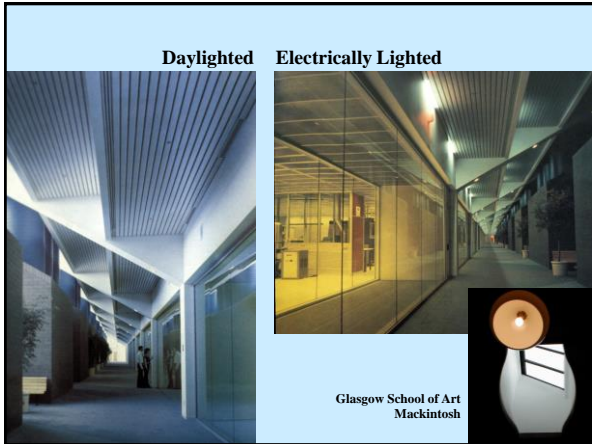
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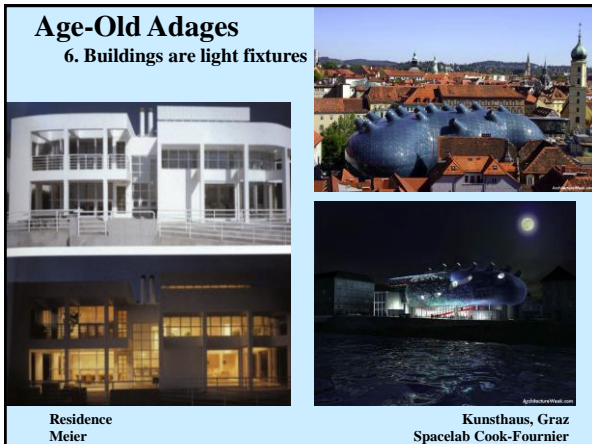
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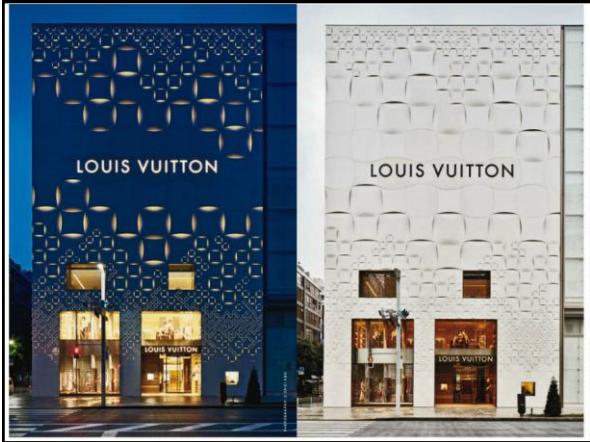
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**Rules-of-Thumb**  
 1. 25% of floor area is maximum skylight area

<< 25%      100%

Crystal Cathedral  
 Phillip Johnson

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**You can estimate aperture effect:**

	<b>Sidelighting</b>	Average DF = $0.2(A_g/A_f)$ Minimum DF = $0.1(A_g/A_f)$
	<b>Toplighting</b> Vertical monitors	Average DF = $0.2(A_g/A_f)$
	<b>Toplighting</b> North-Facing sawtooth	Average DF = $0.33(A_g/A_f)$
	<b>Toplighting</b> Horizontal skylights	Average DF = $0.5(A_g/A_f)$

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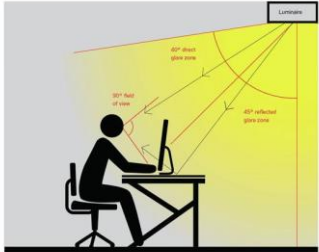
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# Glare

Contrast greater than 1:3, 1:10, 1:100



Direct and Reflected Glare



By daylight or electric light

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## Likely causes of glare:


Unshielded, very bright source, likely to cause glare




Diffused light source can cause glare, but much less



Shielded light source produces virtually no glare



**END GLARE**



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**Challenge**  
Uncontrolled daylight creates glare and excess heat.



**Solution**  
Lutron shades transform this atrium into a comfortable, dynamic space.



Calvert High School - Prince Frederick, Maryland

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### Rules-of-Thumb

2. Avoid glare with apertures in two surfaces



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### Rules-of-Thumb

3. Avoid glare with splayed apertures



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### Rules-of-Thumb

4. Avoid glare with high IRC



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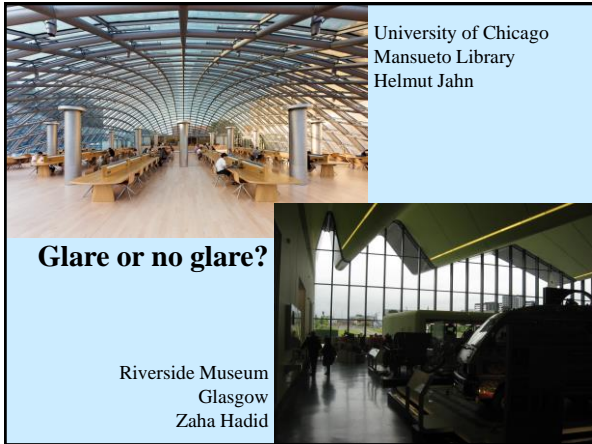
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University of Chicago  
Mansueto Library  
Helmut Jahn

**Glare or no glare?**

Riverside Museum  
Glasgow  
Zaha Hadid

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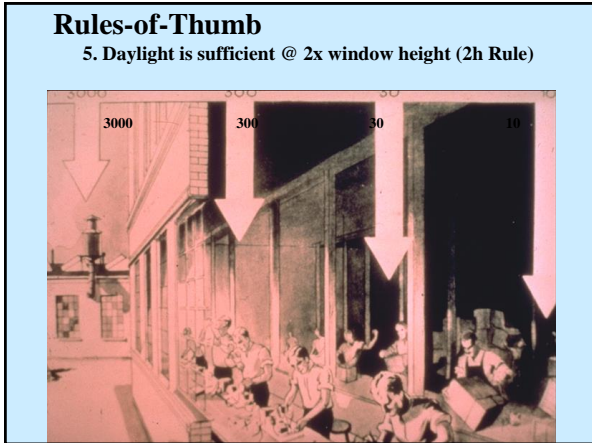
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**Rules-of-Thumb**

5. Daylight is sufficient @ 2x window height (2h Rule)

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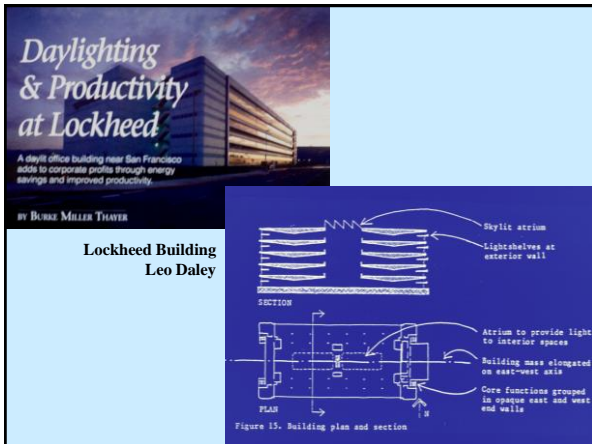
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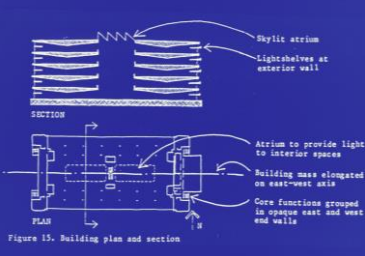


**Daylighting  
& Productivity  
at Lockheed**

A daylight office building near San Francisco adds to corporate profits through energy savings and improved productivity.

BY BURKE MILLER THAYER

**Lockheed Building  
Leo Daley**




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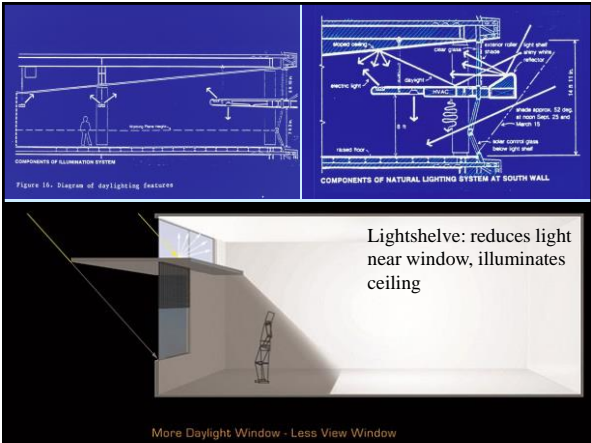
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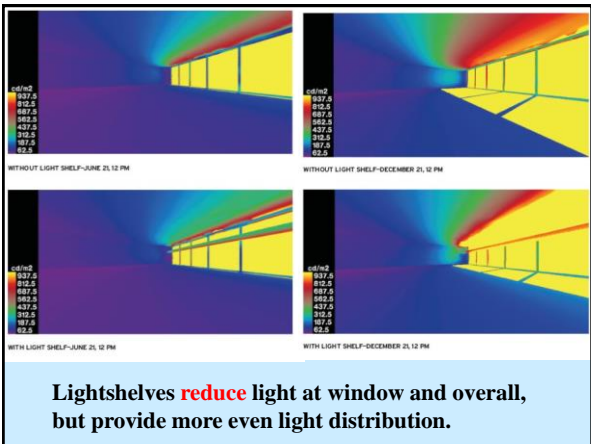
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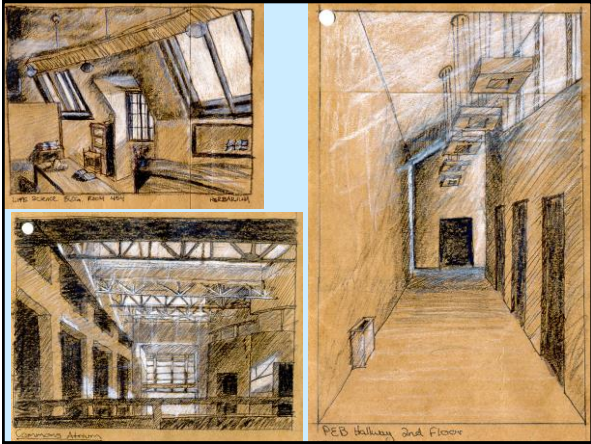
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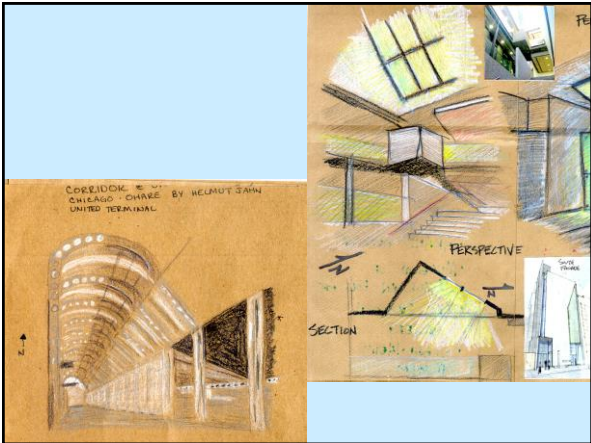
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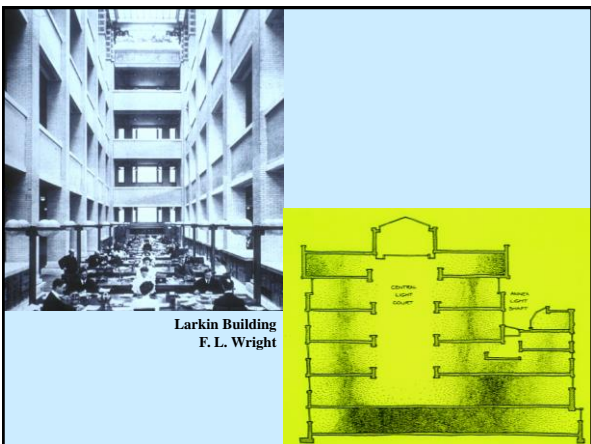
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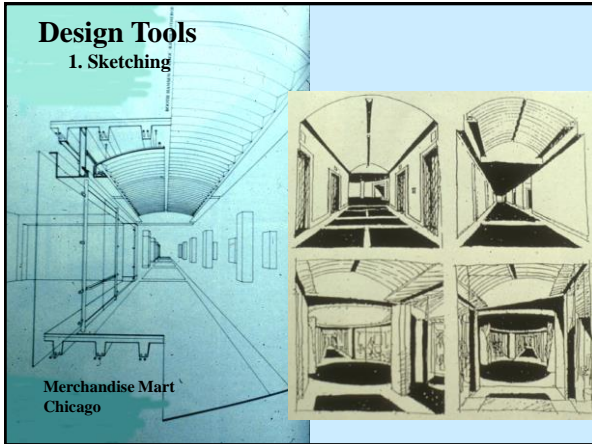
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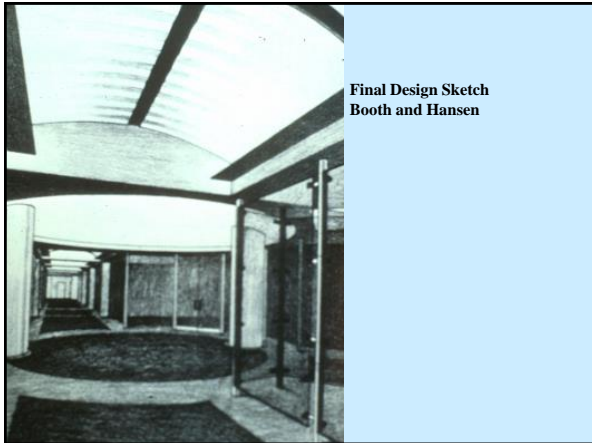
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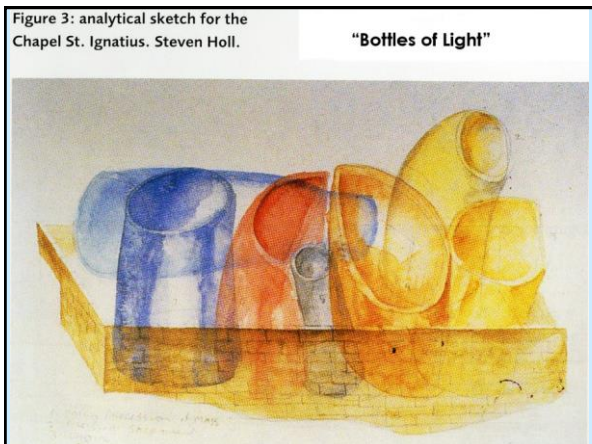
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Drawing in architectural lighting design

**Rigorous design tools to follow...**

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

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