FRAGMENTED VIEWS

solid angle and the search for quantifiable view metrics

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Abstract

Existing view access metrics do not account for multiple view apertures or discontinuous views. Their reliance on linear angles also present some methodological challenges for using computational simulation techniques. In this presentation we propose using solid angles to calculate acceptible view access and point out existing research gaps.





Cleveland Clinic Lou Ruvo Center for Brain Health. Frank Gehry, Architect.







A view within a work or learning environment provides important sociological, psychological, and physical benefits.

View Impacts Include:

- 1. Psychology / Sociology: Position relative to the Collective
- 2. Mind: Ability to re-focus by providing source of distraction, relaxation, and delight
- 3. Eye: Adjust focal length to relax eye
- 4. Pupil: Luminous contrast to create change
- 5. Circadian System: Variation in light intensity and color





Room in Brooklyn, Edward Hopper

Quantifying Quality Views



Access: Perceived size of view within view corridor



Sky + Vegetation + Object > 25' Away



Maintenance: Amount of time quality view is accessible



Openness: Degree of transparency through the view aperture

6







Content: Sufficient interest and variation

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Quantifying Quality Views







Perspective views from office



NORTH FACADE VIEW ACCESS		
\checkmark	ACCESS	Sufficient view s
\	CONTENT	Sky + Vegetatio
-	MAINTENANCE	Roller shades re
	OPENNESS	10% obstructior

Quality View Criteria: Existing research on access



- Use the smaller of horizontal and vertical linear angle?
- How to count interupted views?
- Do multiple windows aggregate?
- Do clerestories count? Is there a vertical cutoff angle?
- Is there positional flexibility? Is there a horizontal cutoff angle?



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Hemispherical Projection EQUI-ANGULAR PROJECTION - AREA OF SURFACES EQUALS THE SOLID ANGLE

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Visual Calibration - Photographic View and 10-Person Survey





View Rating vs. View Size





Medium Perimeter View





Small Perimeter View





FLOOR PLAN



<u>Complex Facade</u>



- 29 total view apertures (3 Perimeter, 26 Clerestory)
 0 with both dimensions greater than 11°
 Total 1,482 deg²











Vertical View Access Cutoff Angles

NEXT STEPS

- Establish acceptability thresholds using large-scale, in-person, peer-reviewed human survey
- Caution against virtual or image-based studies
- Emphasis on minimum size and maximum distance requirements
- Important to test response to linear angle and solid angle as well as dimension
- complex



L+U staff consensus (a x b) : close to acceptability threshold

HYPOTHESES

- For fixed workstations: 80 deg² min view size within 180° horizontal angle
- For flexible workstations: 160 deg² min view size within 360° horizontal angle
- All apertures > 5 deg² can be aggregated as long as they are between 45° and -10° from eye height (for seated applications, 4' above floor level).

• Contiguity tests would be interesting but possibly too

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