Anticipating Popularity of Photographs on Instagram

How Low-level Features of Image Composition Predict Instagram Likes

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Introduction & Research Questions

Abstract

"3.058 people like this." In the digital age, people very commonly indicate their preferences by clicking a *Like* button. The data generated on the photo-sharing platform Instagram potentially represents a vast and freely accessible source for research in the field of visual experimental aesthetics. We compiled the Instagram database, consisting of about 600 architectural photographs and their corresponding liking data generated by the online community. First, we aimed at validating Instagram *Likes* as potential measure for aesthetic appeal by explicitly asking people about their preferences. Second, we checked whether previously studied low-level features of image composition predict Instagram *Likes*. Visual balance has long been considered a basic component of image composition and previous studies computed several balance measures that predict aesthetic liking in simple geometric forms [1]. Another well-studied aesthetic principle is the preference for curvature over angularity [2]. We adjusted these features of image composition to photographic stimuli and used them to predict the number of Instagram *Likes*.
Our study shows a profound link between the number of Instagram *Likes* and subjective liking preferences. We find the preference for curvature in the Instagram database and visual balance accounts for 8 to 17% of variance in Instagram *Likes*, with two contrary effects depending on '2D" or '3D' appearance of the composition.

Study 1 (Manipulation Check)

Instagram Likes and Aesthetic Appeal
- Is the number of Instagram *Likes* a proxy for the aesthetic appeal of photographs?

Visual Balance in Photographs
- Can we reliably measure symmetry, balance, and homogeneity in photographs?

Study 2 (Predicting Instagram Likes)

Using image composition to predict Instagram Likes
- Is the preference for curvature over angularity present in Instagram photographs?
- Can visual balance in image composition predict the number of Instagram *Likes*?
- Are there differences in compositions with '2D' and '3D' appearance?

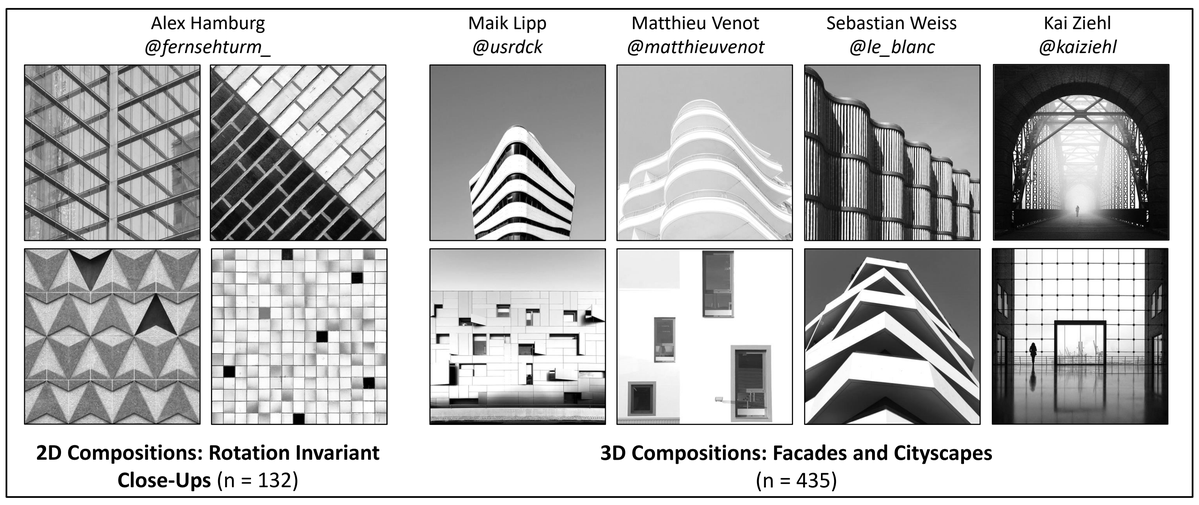
Methods

Instagram Database

The Instagram Database
- Consists of 567 high quality architectural photographs
- Five different photographers
- Number of *Likes* collected manually within fixed time frame

Inclusion criteria
- Professional photographers
- > 10.000 followers on Instagram
- Consistent theme: architectural photography
- 1:1 format

→ control for content, format, and context

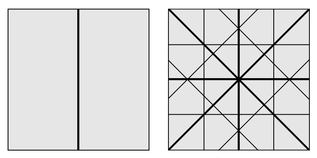


2D Compositions: Rotation Invariant Close-Ups (n = 132)

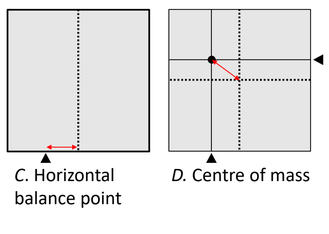
3D Compositions: Facades and Cityscapes (n = 435)

Visual Balance Measures

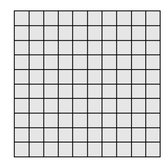
Symmetry and Balance of Weight: Sym_W and Bal_W
- Sym_W is best when right and left half of image have same sum of all pixels' weights (see *A.*)
- Bal_W is best when image is equilibrated across all eight axes (four main axes plus four inner-outer dimensions) [3] (see *B.*)


A. Vertical axis *B.* Eight axes

Symmetry and Balance of Centre of Mass: Sym_{CM} and Bal_{CM}
- Sym_{CM} is best when horizontal balance point is on midline (red arrow indicates distance, see *C.*)
- Bal_{CM} is best when Centre of Mass lies on geometrical midpoint [4] (red arrow indicates distance, see *D.*)


C. Horizontal balance point *D.* Centre of mass

Homogeneity: HG
- Entropy measures evenness of image composition
- HG is best when all bins contain same pixel weight (see *E.*)


E. 10x10 grid

Note*: Pixel weight is luminance score (grey value between 0 to 255).*
The lower the scores, the more symmetric, balanced, and homogenous the images.

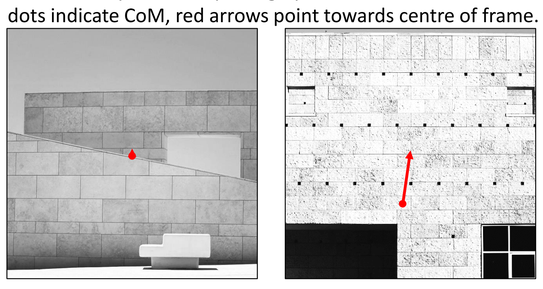
Results

Study 1 (Manipulation Check)

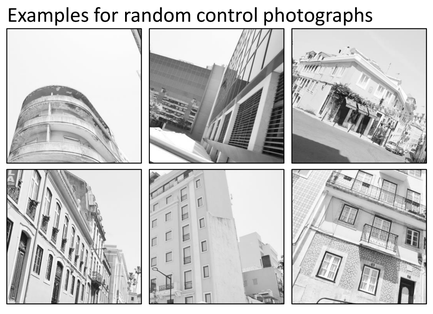
Two alternative forced choice task
- 28 out of 30 participants mainly chose photographs that got more *Likes* on Instagram, when asked for aesthetic liking (*Cohen's d* = 1.36)
- 22 out of 30 participants mainly chose photographs that have better objective Balance of Weight scores, when asked for balance judgments (*Cohen's d* = .72)

Random control photographs
- Photos shot 'from the hip' are comparatively worse in all objective balance measures
- Effect sizes range from .60 to .86 (*Hedge's g*)

Well vs. badly balanced photograph from the 2AFC task. Red dots indicate CoM, red arrows point towards centre of frame.



Examples for random control photographs



Study 2 (Predicting Instagram Likes)

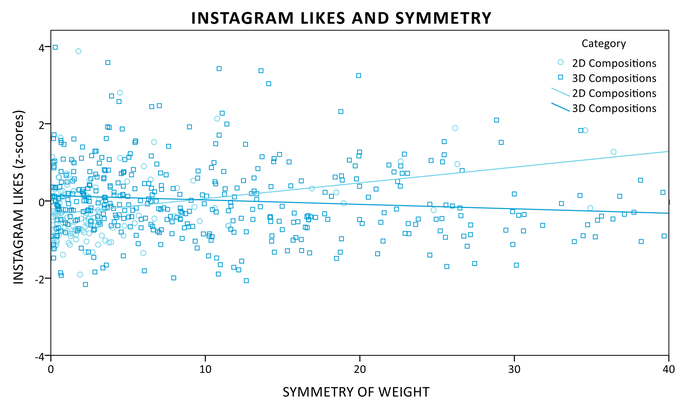
Instagram Likes are predicted by:

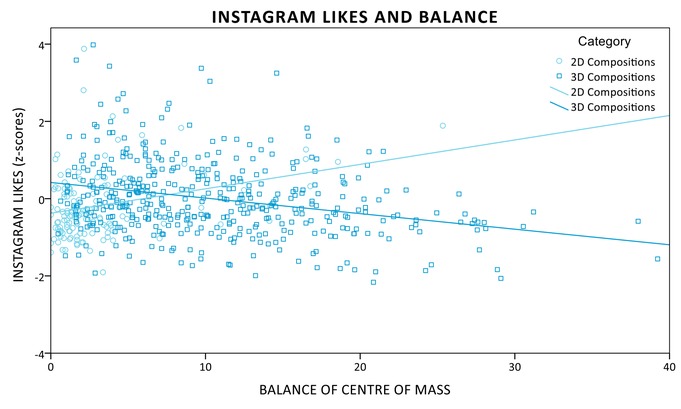
- *Curvature*
  → Curved compositions receive more *Likes* than angular ones (*Cohen's d* = .40)

- *Symmetry* of Weight[1]
  → '2D' Close-Ups: *r* = .289**, **R^2 = .08**
  → '3D' Architecture: *r* = -144.**, **R^2 = .02**

- *Balance* of Centre of Mass[2]
  → '2D' Close-Ups: *r* = .264**, **R^2 = .07**
  → '3D' Architecture: *r* = -.277**, **R^2 = .08**

- *Curvature & Balance combined* ('3D')
  → In angular compositions *balance* has way more power to predict *Likes* (**R^2 = .23**), than in curved (**R^2 = .05**) and mixed compositions (**R^2 = .04**)





[1] Similar results for *SymCM* (*2D:* r = .273**, R^2 = **0.07**, *3D:* r = -.146**, R^2 = **0.02**)
[2] Similar results for *BalW* (*2D:* n.s., *3D:* r = -.318**, R^2 = **0.10**) and *HG* (*2D:* n.s., *3D:* r = -.317**, R^2 = **0.10**)

Summary & Conclusion

Study 1 (Manipulation Check)

- Instagram *Likes* are a proxy for aesthetic appeal of architectural photographs.
- Our balance measures reliably measure perceptual balance in architectural photographs.

These findings provide the basis for further analyses of the relation between Instagram *Likes* and objective balance measures of image composition.

Study 2 (Predicting Instagram Likes)

- The preference for **Curvature** is present in Instagram liking data.
- **Visual Balance** explains up to **10% of variance** in Instagram *Likes* for '3D' architectural photographs, better balance means **more** *Likes*. This effect is most evident in **angular** compositions (**23%**) and less pronounced in curved and mixed compositions (**4-5%**).
- **Visual Balance** explains up to **8% of variance** in simple '2D' photographs, but the relation is reversed: better balance means **less** *Likes*.

This project illustrates the potential of low-level features to predict aesthetic liking in real-life online data. The present study provides a fruitful empirical basis for future research.

Acknowledgements & References

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References
[1] Hübner, R., & Fillinger, M. G. (2016). Comparison of Objective Measures for Predicting Perceptual Balance and Visual Aesthetic Preference. *Frontiers in psychology*, *7*, 335. https://doi.org/10.3389/fpsyg.2016.00335
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