# The interplay between material qualities and lighting

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# The interplay between material qualities and lighting

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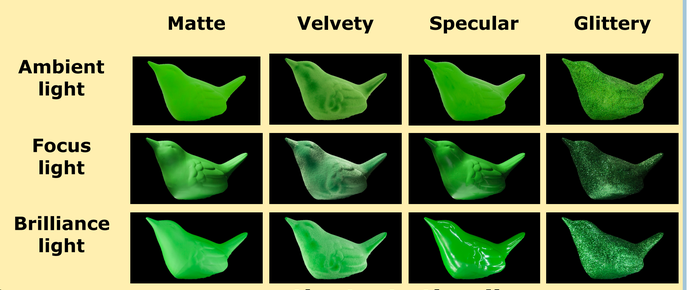
## Introduction

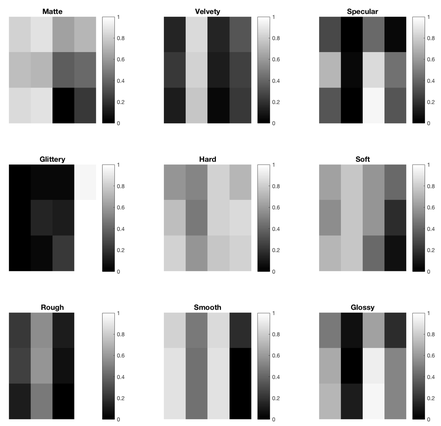
- In a previous study (SPIE2015, JOV2016) we developed a novel material probe, MatMix 1.0, which implemented four canonical surface scattering modes as the basis in optical mixing.
- The four surface scattering modes, namely diffuse scattering, asperity scattering, forward scattering and mesofacet scattering, were represented by covering a same-shaped 3D object with “matte”, “velvety”, “specular”, and “glittery” finishes, respectively.
- All four birds were photographed in so-called ambient, focus and brilliance lighting, three canonical modes that are commonly used in lighting design.
- In the current study we want to answer two questions, which are:
  - is the naming of the four materials we used appropriate?
  - can perceived quality be brought out by certain illuminations?
- 9 inexperienced observers participated in a rating task in English.



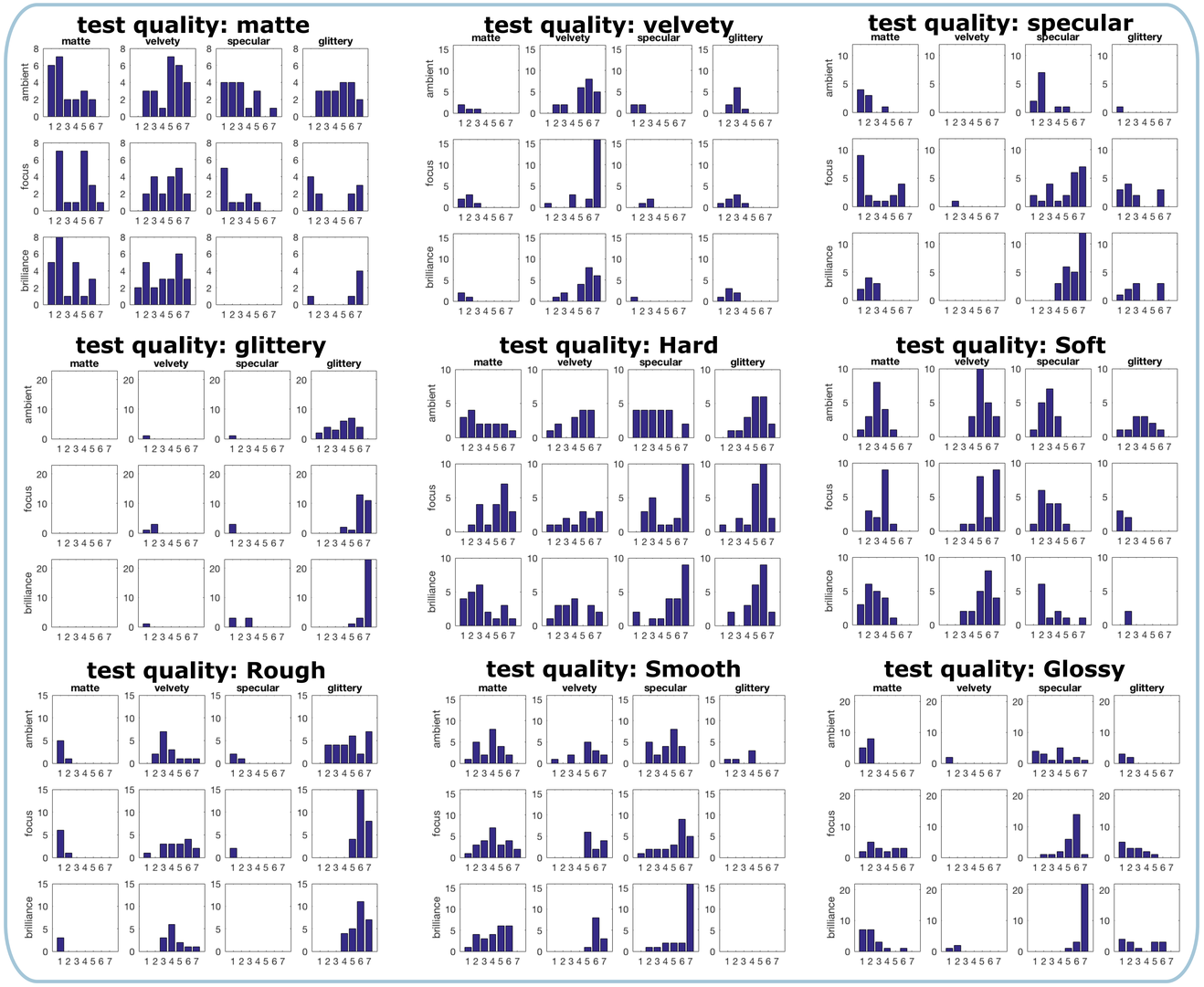

**the test stimuli**

## Method & Results

- Task: Judge 9 test material quality terms: “matte”, “velvety”, “specular”, “glittery”, “hard”, “soft”, “rough”, “smooth”, and “glossy”.
- Step 1: Yes or No question - judge if the term is applicable to the stimulus image.
- Step 2: Rating - If applicable, rate the term on a scale of 1 to 7.
- The frequency of answering “Yes” per term are shown here, each square in the subplots corresponds to a test stimulus in the 3 lightings by 4 materials matrix.
- Distribution for rating values for each test quality term per test stimulus are shown as bar charts in the right.

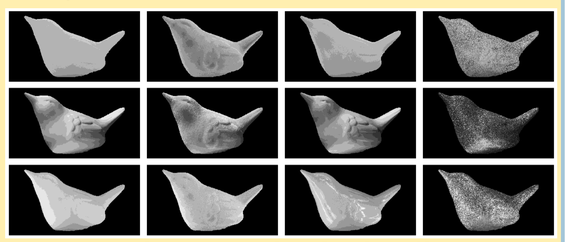



**The frequency of answering “Yes”**




## Discussion

- Among the four names we used, “matte” was the only quality term found applicable to all materials; “velvety”, “specular” and “glittery” specifically applied to those respective materials.
- For “Specular” and “glossy” we found similar judgements.
- Brilliance light brought out “glitteriness”, “specularity”, “glossiness”, and “smoothness” the best; while focus light brought out “velvety”, “soft” and “rough” to some extent.
- The key image features might be the triggers to the perception of certain material qualities, and these features could be optimised by varying the illuminations accordingly.



**the posterised stimuli**

## Acknowledgements

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## Reference

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