Fan ZHANG

An experienced researcher in human-centered research with multi-disciplinary backgrounds in psychophysics, robotics, and engineering.

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Research Experience

12/19-present **University of Birmingham** United Kingdom
Postdoctoral Research Fellow
ESRC-NSF(SBE) with Dr. Dietmar Heinke

Project title: Integrating vision and action through selection history.

- Aim: to understand how recent selection history biases target selection performance via concerted operation between the selection of attention and action across three objectives.
- Focus:
  - test how the history of variations in reach execution (e.g., direct vs. curved movements) impacts subsequent target selection,
  - further establish a plausible computational model (CoRLEGO) for characteristics of priming of pop-out in reach target selection.

12/18-07/19 **Procter & Gamble** Germany
Delft University of Technology The Netherlands
Consumer Market Knowledge Research Fellow (postdoc)

As the external research fellow at the Industrial Design Engineering Faculty (prof. Sylvia Pont) for Procter & Gamble (Consumer Market Knowledge).

- Aim: to quantitatively measure and model user's visual-tactile experience on certain products under different lighting
- Achievements:
  - product dependent effects of lightings and shapes
  - correlations between certain video features and the perceived ratings of the selected attributes
  - translate perceptual data into the selected physical attributes in product design
  - practical guidelines for improving the empirical product design process
- Methods:
  - Setup psychophysical experiments and test students from the university and real consumers recruited by the company as human subjects for comparison
  - Manipulate both visual and tactile information of the product by varying lighting and shape in the photographs and videos as the stimuli

11/13-11/18 **Delft University of Technology** The Netherlands
Human Information Communication Design - Industrial Design Engineering
Ph.D. in Perceptual Intelligence - Visual Perception
EU Marie-Curie ITN (FP7) with Prof. Sylvia Pont and Prof. Huib de Ridder

- **Thesis:** *On Probing Appearance: Testing Material-Lighting Interactions in an Image-based Canonical Approach*
- An EU-founded research and training network – Perceptual Representation of Illumination, Shape & Material (PRISM), collaborating with industries, e.g. Philips.
- Aim: to quantitatively measure and model user's visual experience on material appearance, and understand the influence of lighting.
- Achievements:
  - Develop a novel probing method to quantitatively measure user's visual perception of material and lighting

    - Interpret user data into intuitive understandings for visual perception and design
    - Mapping physical properties and associated human perceptual judgements
    - Identify optical cues that trigger human visual perception of material qualities
- Research method:
    - Psychophysical experiments using novel interactive interfaces
    - Image processing for datasets of scenes varying parametrically
    - Image processing for identifying the sensory cues
    - Optics-based computational modelling of canonical lighting and material modes
    - Data analysis for multivariate statistics in visual perception (Matlab/R/SPSS)

Education

09/12-09/13 **King's College London** United Kingdom
M.Sc. in Robotics

- Graduate with **Distinction**
- **Focus:** Computer Vision/Machine Learning
- **Thesis**: *A Neural Network for Solving the Stereo Correspondence Problem.* I developed a stereovision version of an existing neural network model of primary visual cortex cells, implemented the model on simple artificial scenes and complex realistic scenes.
- **Core Courses**: Artificial Intelligence, Computer Vision, Computer-aided Manufacturing and Design, Pattern Recognition, Real-Time Systems and Control, Robotics Systems, Sensors and Actuators

09/07-07/11 **Shanghai Jiao Tong University** China
B.Eng. in Mechanical Engineering and Automation
Chinese-English Bilingual Program

- **Focus**: Computer-aided Manufacturing and Design
- **Thesis**: *The Identification of Tool Cutting Condition Based on AE (Acoustic Emission) Signal.* I participated in building hardware and software platforms for receiving and processing the AE signal to identify specific tool conditions in manufacturing processes.

ADDITIONAL PROJECTS AND COLLABORATIONS

04/16-11/18 **Visual optimization for material appearance** France
Hosted by Dr. Pascal Barla at INRIA Bordeaux Sud-Ouest

- Aim: to improve user's visual experience on materials by providing optimal lighting
- Achievements:
    - Develop prototypes of canonical material and lighting modes using optics-based computational models
    - Develop a protocol to test complex material-lighting interactions
    - Validate predictions of lighting effects on materials
    - Publications in peer-reviewed journals

02/15-05/15 **Prototyping and experiment** Germany
Hosted by Prof. Roland Fleming at University of Giessen

- Develop prototypes of canonical material modes using 3D modelling and rendering technique
- Experimental design for testing glossiness perception in a project collaborating with a local car coating company CARL SCHLENK AG.

PROFESSION SKILLS

Programming:	MATLAB, OpenGL(GLSL)
Statistical Analysis:	MATLAB, R, SPSS
Design and Engineering:	Photoshop, 3D modelling/rendering software such as Blender, MaxwellRender, AutoCAD, etc.
Language:	Mandarin Chinese (native); English (proficient)

PUBLICATION LIST

Journal Paper

Effects of light direction and shape on the visual perception of canonical materials.
Zhang, F., de Ridder, H., Barla, P., & Pont, S. (2020).
Journal of Vision, *20*(4), 1-18. doi:10.1167/jov.20.4.13

A systematical approach to testing and predicting light-material interactions.
Zhang, F., de Ridder, H., Barla, P., & Pont, S. (2019).
Journal of Vision, *19*(4), 1-22. doi:10.1167/19.4.11

Asymmetric perceptual confounds between canonical lightings and materials.
Zhang, F., de Ridder, H., & Pont, S. (2018).
Journal of Vision, *18*(11), 1-19. doi:10.1167/18.11.11

MatMix 1.0: Using optical mixing to probe visual material perception.
Zhang, F., de Ridder, H., Fleming, R. W., & Pont, S. (2016).
Journal of Vision, *16*(6), 11, 1-18. doi:10.1167/16.6.11

Conference Paper

The influence of lighting on visual perception of material qualities.
Zhang, F., de Ridder, H., & Pont, S. (2015).
In Proc. SPIE/IS&T 9394, Human Vision and Electronic Imaging XX, (pp. 93940Q-93940Q). The international society for optics and photonics. doi:10.1117/12.2085021

Invited Talk

Visual perception of canonical material modes and its interactions with canonical lighting modes.
Zhang, F., de Ridder, H., & Pont, S. (2016, December).
Friday Colloquium (FriKo) of the Max Planck Institute for Biological Cybernetics, in Tübingen, Germany.

Conference Abstract

Material dependent appearance effects brought out by natural light environments.
Zhang, F., de Ridder, H., Barla, P., & Pont, S. (2017).
Poster session presented at European Conference on Visual Perception (ECVP), Berlin, Germany

The interplay between material qualities and lighting.
Zhang, F., de Ridder, H., van Egmond, R., & Pont, S. (2017, Talk).
Journal of vision, *17*(10), 228-228. doi:10.1167/17.10.228

Canonical Material and Illumination Confounds.
Zhang, F., de Ridder, H., & Pont, S. (2016, Poster).
In *PERCEPTION* (Vol. 45, pp. 130-130).

Can people match optically mixed canonical lighting modes?
Zhang, F., de Ridder, H., & Pont, S. (2016, Poster).
Journal of Vision, *16*(12), 642-642. doi:10.1167/16.12.642

The influence of illumination on perception of works by Jan Schoonhoven
Wijntjes, M., te Pas, S., Schoemaker, M. P., Pont, S., Zhang, F., Kartashova, T., & van Middelkoop, C., (2016).
Poster session presented at Visual Science of Art Conference (VSAC), Barcelona, Spain

Matmix 1.0, a noval material probe for quantitatively measuring visual perception of materials.
Zhang, F., de Ridder, H., & Pont, S. (2015, Poster).
Journal of Vision, *15*(12), 824-824. doi:10.1167/15.12.824

Towards an interactive probe for material studies.
Zhang, F., de Ridder, H., & Pont, S. (2014, Poster).
In *Proceedings Experiencing light 2014: international conference on the effects of light on wellbeing, Eindhoven, The Netherlands, 10-11 November 2014* (p. 119).