Theoretical and methodological considerations when planning research on human factors in lighting

CIE Expert Tutorial and Workshop on Research Methods for Human Factors in Lighting
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WE ARE DIFFERENT IN THE DARK
MORE AGGRESSIVE

Page & Moss, 1976
LESS HONEST

Zhong, Bohns, & Gino, 2010
VALENCE JUDGEMENTS

Frank & Gilovich (1988)
Lakens, Fockenberg, Lemmens, Ham & Midden (2013)
Schietecat, Lakens, Ijsselsteijn & de Kort (2018)
VISION REQUIRES LIGHT

I think I can see something.

iStockphoto.com
Skyspace – James Turrell
Photo: Florian Holzherr
SELF AWARENESS

Steidle & Werth (2014)
SELF CONTROL

Steidle & Werth (2014)
LIGHT ENTRAINS OUR BIOLOGICAL CLOCK

• Terman, M., & Terman, J. S. (2005). Light therapy for seasonal and nonseasonal depression: efficacy, protocol, safety, and side effects. CNS Spectrums, 10, 647–663.


LIGHT & DEPRESSION


SLEEP QUALITY AND BEYOND

LIGHT ACTIVATES THE BRAIN
LIGHT AND VITALITY, COGNITION
ALERTING EFFECTS

WORK ENGAGEMENT AND SATISFACTION
PSYCHOLOGICAL FUNCTIONING

Behaviour and the mental processes that drive it:
perception, attention and cognition, emotion (affect), motivation (conation)

Footnote
PATHWAYS OF LIGHT RELEVANT TO PSYCHOLOGICAL FUNCTIONING
(Source: De Kort & Veitch, 2014)
IMAGE FORMING AND NON IMAGE FORMING EFFECTS
IMAGE FORMING PATHWAY
Visual performance

Visual comfort
Visual experience
Light

Non-image forming pathway

Circadian effects

Acute effects

Psychological functioning

NON IMAGE FORMING PATHWAY
Circadian effects
Acute effects
LIGHT PLACEMENT AND DIRECTION
TIME SCALE OF EFFECTS
AMBIGUOUS FINDINGS/STUDIES

De Vries, Souman, de Ruyter, Heynderickx, de Kort, 2018
Implications for Research design & interpretation

ALL MAY BE AT PLAY
HYPOTHESIS FORMULATION

Start with a clear and specific hypothesis
Indicate the direction and expected effect size
Consider alternative theories
Selection, control & quantification of psychological indicators (non-trivial) light parameters (e.g. photometric vs. radiometric)

Prevent /control confounds

OPERATIONALIZATION & QUANTIFICATION
STATISTICAL CONTROL
Exact (basic repetition)

Conceptual (different procedure, manipulation and/or measurement)

Constructive (add conditions, e.g. extra level, control condition, moderator)
THANK YOU