Retail Lighting: Shedding Light on People, Products/Brands and Spaces
Katelijn Quartier, Faculty of Architecture and Arts
Agenda
A Little Lighting History
Creating Atmosphere
Retail Lighting Research
Added Value
A Little Lighting History

Daylight: to Hell and Back

- Until the end of the 18th century: atria to highlight goods via natural lighting
- Until the 1920’s daylight was seen as essential. After the adoption of gaslights and arc lights in department stores they became less dependent on daylight
- In the 1970’s, partly due to the energy crisis, daylight became more attractive again (electric lighting consumed about 70% of the total energy usage)
- Nowadays, with the increasing attention to sustainability, daylight has reclaimed its place in retail design
Artificial Lighting

- by the turn of the 19th century **gaslights** were first used in **department stores**
- Paris and London were the first cities that laid gas pipes throughout large parts of the city > a **shift in urban life** + stores were able to stay open longer and street lighting generated ‘**window shopping**’
- In 1878 the first electric streetlamps appeared in **London and Paris**
- the next step was ‘neon lights’ (1930’s) ideal for signs and advertising
- the **fluorescent tube**, developed between 1934 and 1938, and the **incandescent halogen light source**, in the 1950’s, light for (at that time) comparatively little energy was available (about a quarter of the energy of incandescent lamps)
- this led to ‘**the more light, the better**’ concept
A Little Lighting History

Artificial Lighting

- until the early 1970’s, the quantity aspects of lighting in commercial spaces seemed to have the upper hand.
- this changed during the 1970’s, partly due to the economic crisis and the general recession
- in retail spaces, lighting has always been essential, but it has not always been credited with the atmosphere it can create.
- although lighting design changed after the 1970’s, many retailers did not integrate lighting as part of the retail concept; too often lighting was the last stage in budgeting a programme. During the last two decades this has changed drastically.
A Little Lighting History

Poor lighting could ruin any (retail) design

Skilful use of lighting can often improve mediocre designs

Lighting is the single element most able to give a store its atmosphere
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Trends in Retail Lighting

Manufacturers and merchants (till couple years ago)
- general lighting first, then adding accent lighting
- no dark spots
- lux-oriented
- avoid daylight

→ trend towards high lux-levels and cold white light
   now shift towards more ecological solutions

Designers
- trend sensitive
- tension between light and darkness
- atmosphere-oriented
- impact of light on people

→ trend towards drama and experience
Trends in Retail Lighting
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Retail Space

Functional
- Lay-out: departments, spatial compartments, density of shop fittings, pay area,...
- Signing: pricing, tone of voice, signposts, indication of promotions,...
- Routing

Aesthetical
- Design language: materials, colours, shapes,...
- Graphical elements: photography, graphics,...

atmospherical
- Sent (Sight)
- Smell
- Sound
- Taste
- Cleanliness
- Safety and security

Visual Merchandise

Determines whether it works
Determines the atmosphere
Retail Space

Functional
- Lay-out: departments, spatial compartments, density of shop fittings, pay area, ...
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Visual Merchandise
- Lighting

Determines whether it works
Determines the atmosphere
Wedgewood - Wigmore Sports - Corres - Wholefoods - Carlos Miele - Lairesse - Barbi - Philips
Dinsdag 2 juli 13
Dinsdag 2 juli 13
Agenda

A Little Lighting History
Creating Atmosphere
Retail Lighting Research
Added Value
Agenda

A Little Lighting History
Creating Atmosphere

Retail Lighting Research
  * PhD. study
  * Student projects
  * Retailers

Added Value
PhD study: lighting in supermarkets
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Deeper understanding of the impact of lighting on:
perceived atmosphere
affect
the resulting behaviour

Supermarkets: contain almost all-possible lighting technologies

Need for more impartial research and knowledge: manufacturers still dominate the market and the research

Lab environment: to control the environment
Real supermarket: context with many other aspects intervening
Literature:

Lighting has an influence on:

- the route the customers take (Taylor and Socov, 1974)
- the attention drawn to products (LaGuisa and Perney, 1974)
- the amount a product is examined and handled (Areni and Kim, 1994)
- the attractiveness of products (Magnum, 1998; Summers en Hebert, 2001)
RESEARCH MODEL

Interpreted space

Light

atmospheric

Behavior

browsing  buying

mood  emotions

dinsdag 2 juli 13
Supermarket

Lighting

Interpreted space

Cognition

atmospheric

Affect

mood

emotions

Experiment 1

Experiment 2 en 3

Experiment 4 en 5

researcher

participants

browsing

effective

buying
### FIVE EXPERIMENTS

<table>
<thead>
<tr>
<th>Experiments</th>
<th>Product (phase 1)</th>
<th>Space (phase 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp. 1A</td>
<td>Exp. 1B</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>Product preference</td>
<td>Product preference/behaviour</td>
</tr>
<tr>
<td>Context</td>
<td>Photographs of single products</td>
<td>Simulation supermarket</td>
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<tr>
<td>Procedure</td>
<td>Paired comparison (no forced choice)</td>
<td>Paired comparison (forced choice)</td>
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<tr>
<td>Measuring preference</td>
<td>Stated</td>
<td>Revealed</td>
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<tr>
<td>Presence of moderating variables</td>
<td>Low</td>
<td>Medium</td>
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<tr>
<td>Ecological validity</td>
<td>Low</td>
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</table>
Experiment 1A: Photo Elicitation

Does different lighting influence the attractiveness of products?
Experiment 1A: Photo Elicitation

Does different lighting influence the attractiveness of products?

Dinsdag 2 juli 13
Experiment 1B: Product preference in lab supermarket
Experiment 1C: buying behaviour (Product) in lab supermarket

What happens when context is added?
Experiment 1B: Product preference in lab supermarket (120 people)
Experiment 1C: buying behaviour (Product) in lab supermarket (120 people)

Results 1B:
- influence of lighting on green vegetables (CDM 930 vs SDW 825)
- influence of routing
- influence of right-left handed

No results 1B:
influence of personal characteristics
influence of shopping behavior

Experiment 1C: no results
Experiment 2: Lab Supermarket

- high quality (Delhaize)
- discounter (Carrefour)
- hard discounter (Aldi)
## Experiment 2: Lab Supermarket

<table>
<thead>
<tr>
<th></th>
<th>Lux (average)</th>
<th>Groceries</th>
<th>Dairy</th>
<th>Bread</th>
<th>Cosmetics</th>
<th>Wine</th>
<th>Fruit &amp; Veg</th>
</tr>
</thead>
<tbody>
<tr>
<td>High quality</td>
<td>826</td>
<td>640</td>
<td>836</td>
<td>510</td>
<td>390</td>
<td>1054</td>
<td></td>
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<tr>
<td>Discouter</td>
<td>853</td>
<td>917</td>
<td>1100</td>
<td>1086</td>
<td>759</td>
<td>1488</td>
<td></td>
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<tr>
<td>Hard discounter</td>
<td>412</td>
<td>535</td>
<td>412</td>
<td>412</td>
<td>412</td>
<td>412</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Accent lighting</th>
<th>Groceries</th>
<th>Dairy</th>
<th>Bread</th>
<th>Cosmetics</th>
<th>Wine</th>
<th>Fruit &amp; Veg</th>
</tr>
</thead>
<tbody>
<tr>
<td>High quality</td>
<td>None</td>
<td>TL830</td>
<td>TL830 shelves &amp; CDM830 spot</td>
<td>TL830 shelves</td>
<td>CDM930</td>
<td>SDW930</td>
<td></td>
</tr>
<tr>
<td>Discouter</td>
<td>None</td>
<td>TL840</td>
<td>TL830 shelves</td>
<td>TL830 shelves</td>
<td>SDW825</td>
<td>CDM930 (F) &amp; CDM942 (V)</td>
<td></td>
</tr>
<tr>
<td>Hard discounter</td>
<td>None</td>
<td>TL830</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

dinsdag 2 juli 13
Experiment 2: Lab Supermarket

METHOD

➢ 96 People took part in the experiment
➢ Realistic shopping scenario
➢ Items “priced” with credits, budget of 50 credits
➢ Between-subjects design: each participant experienced only one setting
➢ Participants were unaware of the exact goal of the study

MEASURES

Atmosphere: (adapted) tool to quantify the ‘perceived atmosphere’ (Vogels, 2008)
Behaviour: time spent, products bought, amount spent
Price and Image Perception: scale 1-10
SOME RESULTS

<table>
<thead>
<tr>
<th>Measure</th>
<th>High Quality (n = 33)</th>
<th>Discounter (n = 29)</th>
<th>Hard Discounter (n = 33)</th>
<th>F(2, 92)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasure (PAD)</td>
<td>5.31</td>
<td>4.81</td>
<td>4.60</td>
<td>5.21</td>
<td>0.007</td>
</tr>
<tr>
<td>Cosiness (atmosphere)</td>
<td>3.73</td>
<td>3.32</td>
<td>3.34</td>
<td>1.72</td>
<td>0.185</td>
</tr>
<tr>
<td>Liveliness (atmosphere)</td>
<td>3.89</td>
<td>3.57</td>
<td>3.26</td>
<td>2.96</td>
<td>0.057</td>
</tr>
<tr>
<td>Tenseness (atmosphere)</td>
<td>2.29</td>
<td>2.73</td>
<td>2.73</td>
<td>1.17</td>
<td>0.314</td>
</tr>
<tr>
<td>Time (seconds)</td>
<td>173</td>
<td>143</td>
<td>164</td>
<td>1.44</td>
<td>0.24</td>
</tr>
<tr>
<td>Credits spent</td>
<td>18.75</td>
<td>16.48</td>
<td>20.06</td>
<td>2.02</td>
<td>0.14</td>
</tr>
<tr>
<td>Products bought</td>
<td>13.03</td>
<td>11.31</td>
<td>13.76</td>
<td>1.87</td>
<td>0.16</td>
</tr>
<tr>
<td>Perceived price level</td>
<td>5.64</td>
<td>4.83</td>
<td>4.85</td>
<td>1.52</td>
<td>0.220</td>
</tr>
<tr>
<td>Service</td>
<td>6.88</td>
<td>6.24</td>
<td>5.76</td>
<td>2.02</td>
<td>0.148</td>
</tr>
<tr>
<td>Quality</td>
<td>7.57</td>
<td>6.76</td>
<td>6.82</td>
<td>1.99</td>
<td>0.142</td>
</tr>
</tbody>
</table>

Table 1. Results (mean) for the PAD questionnaire, the atmosphere subscales, behaviour, and the price and image perception for the three settings with the p-value (one-way ANOVA)
Experiment 2: Lab Supermarket

SOME RESULTS

High Quality setting was recognized as such

![Graph showing perceived similarity of stores](image)

Figure 2. Perceived similarity of the three stores to existing stores (due to some participants indicating more than one of the alternatives the total percentage per lighting setting exceeds 100%).

Carrefour has the shortest average shopping time (143s), Aldi (164s), Delhaize (173s) NOT Significant!
SOME RESULTS

The perception of the three settings:

most robust differences between high-end lighting setting (Delhaize) and other two

The type of feelings were linked to the perceived atmosphere, but the intensity of those feelings were not
Experiment 3: Real Supermarket

630 lux/3000K

480 Lux/2750K

870lux/4800K

Red LED-wand

Blue LED-wand

dinsdag 2 juli 13
Experiment 3: Real Supermarket

630 lux/3000K (1 year in advance)  480 Lux/2750K  870lux/4800K

<table>
<thead>
<tr>
<th></th>
<th>Illuminance</th>
<th>CT</th>
<th>Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>480</td>
<td>2750</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>480</td>
<td>2750</td>
<td>On/red</td>
</tr>
<tr>
<td>3</td>
<td><strong>870</strong></td>
<td>4800</td>
<td>Off</td>
</tr>
<tr>
<td>4</td>
<td>870</td>
<td>4800</td>
<td>On/blue</td>
</tr>
<tr>
<td>5</td>
<td>650</td>
<td>5400</td>
<td>Off</td>
</tr>
<tr>
<td>6</td>
<td>650</td>
<td>5400</td>
<td>On/blue</td>
</tr>
<tr>
<td>7</td>
<td>500</td>
<td>4000</td>
<td>Off</td>
</tr>
<tr>
<td>8</td>
<td>500</td>
<td>4000</td>
<td>On/blue</td>
</tr>
<tr>
<td>9</td>
<td><strong>630</strong></td>
<td>3000</td>
<td>Off</td>
</tr>
</tbody>
</table>
Experiment 3: Real Supermarket

METHOD

During a period of 11 days, 664 people were questioned, 441 after the shopping experience and 213 during their shopping. Behaviour was measured during 21 weeks. Participants were unaware of the exact goal of the study.

MEASURES

Mood: Short Mood Form (Brengman, 2002)
Atmosphere: a tool to quantify the ‘perceived atmosphere’ (Vogels, 2008)
Image of Plus store
Behaviour: time spent, products bought, amount spent
Experiment 3: Real Supermarket

SOME RESULTS

Lighting influences only the level of perceived ‘Coziness’
Experiment 3: Real Supermarket

SOME RESULTS

Lighting effects consumers’ emotions

![Graph showing lighting effects on consumers' emotions]

- Average scores (7-point scale)
- Pleasure
- Arousal

<table>
<thead>
<tr>
<th>Lighting Setting</th>
<th>Pleasure</th>
<th>Arousal</th>
</tr>
</thead>
<tbody>
<tr>
<td>480lux 2750K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500lux 4000K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>630lux 3000K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>650lux 5400K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>870lux 4800K</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*dinsdag 2 juli 13*
## SOME RESULTS

<table>
<thead>
<tr>
<th>Measure</th>
<th>480lx 2750K</th>
<th>480lx 2750K + LED</th>
<th>500lx 4000K</th>
<th>500lx 4000K + LED</th>
<th>630lux 3000K</th>
<th>650lx 5400K</th>
<th>650lx 4500K + LED</th>
<th>870lx 4800K</th>
<th>870lx 4500K + LED</th>
<th>F (8, N)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasure (PAD)</td>
<td>6.02</td>
<td>5.55</td>
<td>5.78</td>
<td>5.33</td>
<td>6.12</td>
<td>5.67</td>
<td>5.54</td>
<td>5.49</td>
<td>5.50</td>
<td>2.07</td>
<td>0.04</td>
</tr>
<tr>
<td>Cosiness (atmosphere)</td>
<td>4.79</td>
<td>4.24</td>
<td>4.04</td>
<td>3.95</td>
<td>4.54</td>
<td>4.15</td>
<td>4.31</td>
<td>4.21</td>
<td>4.21</td>
<td>1.63</td>
<td>0.11</td>
</tr>
<tr>
<td>Liveliness (atmosphere)</td>
<td>5.17</td>
<td>4.51</td>
<td>4.55</td>
<td>4.46</td>
<td>5.03</td>
<td>4.57</td>
<td>4.74</td>
<td>4.85</td>
<td>4.89</td>
<td>1.69</td>
<td>0.10</td>
</tr>
<tr>
<td>Tenseness (atmosphere)</td>
<td>1.74</td>
<td>1.91</td>
<td>1.80</td>
<td>1.99</td>
<td>1.81</td>
<td>1.97</td>
<td>2.25</td>
<td>2.11</td>
<td>1.79</td>
<td>1.38</td>
<td>0.20</td>
</tr>
<tr>
<td>Detachment (atmosphere)</td>
<td>3.06</td>
<td>2.98</td>
<td>2.88</td>
<td>2.87</td>
<td>2.88</td>
<td>3.05</td>
<td>3.22</td>
<td>3.04</td>
<td>2.97</td>
<td>0.58</td>
<td>0.79</td>
</tr>
<tr>
<td>Image</td>
<td>4.42</td>
<td>4.13</td>
<td>4.05</td>
<td>4.03</td>
<td>3.98</td>
<td>4.08</td>
<td>4.03</td>
<td>4.30</td>
<td>3.93</td>
<td>1.57</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Table 3. Mean of the Pleasure, atmosphere scales and image per setting, F and p-value (one-way ANOVA), the atmosphere questionnaire

- **Behaviour** (browsing, products bought, time spent and money spent): **no significant differences**
- The **type of feelings** were linked to the **perceived atmosphere**, as well as the **intensity** of those feelings.

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| dinsdag 2 juli 13 |
Experiment 3: Real Supermarket

AWARENESS SHORT TERM

Are the consumers aware of the light setting they just saw?

Recognition of the colour of the LED-wall (outside supermarket via 3 photographs)
Experiment 3: Real Supermarket

AWARENESS LONG TERM

Have the consumers noticed the change of the lighting during the last weeks?

- Change of lighting during the last 3 months: 25%
- Colour change of the LED-wall: 17.5%
Experiment 3: Real Supermarket

Does the perceived atmosphere correspond with Plus’ image?

Based on light setting (based on 5-point scale)

<table>
<thead>
<tr>
<th>LED-Wall</th>
<th>IMAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>4,17</td>
</tr>
<tr>
<td>On</td>
<td>3,99</td>
</tr>
</tbody>
</table>

no significant effect of light setting

<table>
<thead>
<tr>
<th>SettingLux</th>
<th>IMAGE LSMEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>480lux</td>
<td>4,23</td>
</tr>
<tr>
<td>2750K</td>
<td></td>
</tr>
<tr>
<td>500lux</td>
<td>4,10</td>
</tr>
<tr>
<td>4000K</td>
<td></td>
</tr>
<tr>
<td>630lux</td>
<td>3,86</td>
</tr>
<tr>
<td>3000K</td>
<td></td>
</tr>
<tr>
<td>650lux</td>
<td>4,09</td>
</tr>
<tr>
<td>5400K</td>
<td></td>
</tr>
<tr>
<td>870lux</td>
<td>4,11</td>
</tr>
<tr>
<td>4800K</td>
<td></td>
</tr>
</tbody>
</table>
## SOME RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Product (phase 1)</th>
<th>Space (phase 2)</th>
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<tbody>
<tr>
<td><strong>Experiments</strong></td>
<td>Exp. 1A</td>
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<td>Medium</td>
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<tr>
<td>Ecological validity</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Dependent variables</td>
<td>Product preference</td>
<td>Product preference/behaviour</td>
</tr>
<tr>
<td>Results</td>
<td>confirmed</td>
<td>confirmed for green vegetables</td>
</tr>
</tbody>
</table>

*solid*, *only one*, *none*, *solid*
Even within the boundaries of **functionally appropriate lighting**, an otherwise **identical supermarket environment** can not only be given a different, but even a **very specific atmospheric appearance**.

No specific guiding principles, though several assumptions were countered.
CONCLUSIONS

Stimuli

Source designer

lighting

Message

Affect

Supermarket

participants

researcher

Cognition:
- aesthetic impression
- semantic interpretation
- attention drawing

Perception

atmosphere

Response

behaviour

product preference

Organism

mood

eotions
Visualisation of the general lighting of the lab settings (with black circle) and Plus settings in the Kruithof curve.
The two settings that generated the highest ‘Pleasure’ (pink & green) are the ones located outside the comfort zone. Also the red one generated the highest ‘Cosiness’ and the green one the highest ‘Liveliness’.

IMPLICATION
relatively subtle difference in lighting, an otherwise identical supermarket environment can be given a different, or even very specific, atmosphere.

Not only were the participants able to recognize different atmospheres, they also scored them accordingly concerning quality and price perception in the lab.

In the real supermarket different settings elicited different image perceptions. This is highly relevant when it comes to store branding and store personality.

Investing in lighting that communicates the right message might generate costumer loyalty, which, to our opinion might be more valuable on the longer term than immediate sales results.
Visibility: study by students

Flash shoe store, Hasselt BE

Planet Perfume, Hasselt BE
Visibility: study by students

RESULTS

Have you noticed the coloured lighting in the store?
20 people questioned outside the store (of which 19 people had visited the store before that day)

- Flash shoe store, Hasselt BE
  - Yes: 13
  - No: 7

- Planet Perfume, Hasselt BE
  - Yes: 4
  - No: 16

Contribution to the store’s image 20/20
Contribution to the store’s image 12/20
COLOUR PERCEPTION
80 men/women between 18 and 70

On a 6-point scale:
- lively-boring
- safeness-danger
- warm-cool
- relaxing-arousing
- pleasing-displeasing
- happy-depressing
- aggressive-soft
- oppressive-casual
- inviting-distant
Added value: lab experiment
Visibility/impact: coloured light on site
Visibility/impact: coloured light on site

MEASURES

- Subjective appreciation (interview): 30 people (5 per colour - purple/ yellow/green/white/red/blue)
- Observation camera’s
- Products of those shelves sold: 37 days of which 20 days the lighting was on (green).
RESULTS

- Subjective appreciation:
  75% says positive to the atmosphere

- Observation:
  no change in behaviour

- Products of those shelves sold:
  no significant difference

Visibility/impact: coloured light on site
Agenda

A Little Lighting History
Creating Atmosphere
Retail Lighting Research
Added Value
Added value

Preference blue backlighting
Even with 50% power reduction, no effect on sales number

Source: LRC (2005)
Added value?: case study
Added value!: case study

SHOEBALOO AMSTERDAM (fluorescence)
Added value?: case study

Lairaisse Pharmacy
Added value?: case study

H&M Barcelona
Added value?: case study

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SNOG LONDON: The sound system is specially curated and the lighting patterns respond in real time to the sound in the store. Inside each ribbon are hundreds of LEDs that shuffle and change depending the sound.
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Any Questions?
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examenvragen: