Restorative Environmental Design

Mike Burnard
People spend 80-85% of their time indoors and our environment is thought to impact our health in many ways.
Restorative Environmental Design (RED) is a building design paradigm combining sustainable building practices with building practices that benefit occupant health.
RED goes two steps further than just sustainable construction...

Buildings should:
• provide healthful benefits to occupants
• reinforce the human connection with nature

What is a restorative environment?

Mike Burnard. SWST International conference, Zvolen, Slovakia, June 2014
Restorative environments

In environmental psychology they have four main characteristics (Kaplan, 1995)

• Being away
• Effortless fascination
• Extent
• Compatibility
Restorative environments: Being away

How does one fulfill the sense of being away while inside a building?

- Indoor gardens
- Views of nature
- Water features
- Any location that is different enough from a typical workstation (Wilson, 2008)


Mike Burnard. SWST International conference, Zvolen, Slovakia, June 2014
Restorative environments: Fascination

Natural patterns, shapes and forms allow the mind to *effortlessly* focus on something (Kellert, 2008; Wilson, 2008)
Restorative environments: Extent

Open spaces, ceilings with varying height, views of nature all provide a sense of *extent*
Restorative environments: Compatibility

Humans seem to have a natural affinity for nature
How do we apply RED?

Biophilic design for the occupants

Green building methods for the building

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Biophilic design

In sustainable design, we ask, “what is our impact on nature?”

In biophilic design, we ask, “what impact does nature have on us?”

-Jennifer Heerwagen
Biophilic design

Six basic tenets:

1. Environmental features
2. Natural shapes and forms
3. Natural patterns and processes
4. Light and space
5. Place-based relationships
6. Evolved human relationships with nature

Mike Burnard. SWST International conference, Zvolen, Slovakia, June 2014
What’s next?

Evidence based building design decisions.

For sustainable building practices we can monitor impacts and gauge decisions using tools like LCA and EPD’s.

For occupant health?
Evidence based design: Occupant health

This can be difficult to assess.

Our interest is in how material choices impact human stress.

We will test occupants recovery from stress in environments with different materials to find out.
Our studies: Naturalness

Replicating, embracing and including nature are key aspects of restorative environmental. We want to know what people think is natural, so we replicated a study done in Norway in both Slovenia and Finland.

The work in Finland was part of a STSM for COST Action FP1303.
Our studies: Naturalness

Generally, wood and stone were expected to be deemed the “most natural” and were.

There were notable differences between countries on individual samples, but agreement overall
Our studies: Naturalness

Ratings (between 1-7, not natural to natural) revealed several differences between countries

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Finland – Norway</th>
<th>Finland – Slovenia</th>
<th>Norway – Slovenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particleboard</td>
<td>0.031 *</td>
<td>0.002 ***</td>
<td>0.891</td>
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<tr>
<td>Brick Tile</td>
<td>0.604</td>
<td>0.044 *</td>
<td>0.829</td>
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<tr>
<td>WPC, Growth rings</td>
<td>0.342</td>
<td>0.049 *</td>
<td>&gt;0.001 ****</td>
</tr>
<tr>
<td>Ash, heartwood</td>
<td>-</td>
<td>0.054</td>
<td>0.048 *</td>
</tr>
<tr>
<td>MDF, untreated</td>
<td>0.090</td>
<td>0.023 *</td>
<td>-</td>
</tr>
</tbody>
</table>

Results from pairwise Wilcoxon rank sum tests with Bonferroni adjustments for multiple comparisons
Our studies: Stress, stress recovery and wood in the built environment

We will soon start a study comparing stress responses and stress recovery in 9 office-like rooms (3.0 m x 2.5 m).

UP IAM has a strong psychology department who will collaborate with us for this project.
Experiments with wood and health indoors

Fell, 2010
Evidence based design: Experiments

During and shortly after a simple math test, occupants in the wood room demonstrated slightly lower stress levels by one measure (galvanic skin response) (Fell, 2010).
Our studies: Stress, stress recovery and wood in the built environment

8 rooms are made from combinations of 3 aspects of wood:

Grain pattern: prominent (oak), subtle (beech)
Colour: light, dark
Quantity: 35% coverage, 65% coverage

+ 1 control room without wood

Mike Burnard. Fraunhofer WKI, Braunschweig 11 March 2014
30 subjects will be tested in each wood room

All subjects will be tested in the control room

Research at UP IAM: Stress recovery

WR 1
WR 2
WR 3
WR 4
WR 5
WR 6
WR 7
WR 8
CR

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Research at UP IAM: Stress recovery

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Thanks very much!

Questions or comments?

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Videologin.net, from The Noun Project

Bram van Rijen, from The Noun Project