CAN ARCHITECTURAL SPACE BE HEALING?
A VIRTUAL STRESS EXPERIMENT

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CAND. ARCH. MAA. PH.D.
Background:
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1984 Graduated as an architect
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1984 – 2008
Worked at an architectural office
1998– 2008 as a partner.
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2007 – 2008  Project manager; ICU
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2008 – 2009
The “Helende Arkitektur” (“Healing Architecture”) Project in cooperation with Aalborg University.

A review report of approx.. 200 articles how hospital design might influences treatment, patient and staff safety, way-finding in hospitals etc.
Background:

Patients who had undergone gall bladder surgery

Ulrich, 1984
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Tree-group vs. wall-group:

Hospitalized 7.96 vs. 8.70 days

Ulrich, 1984
Because the patient rooms are identical, no data about the architecture itself is produced.
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Can the architecture itself influence the healing process by way of the stress system?
Background:

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- Architecture must be the variable
Can the architecture itself influence the healing process by way of the stress system?

- Architecture must be the variable
- Data must be physiological.
The Trier Social Stress Test (TSST)

Psychosocial stress

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Psychosocial stress

Lab set-up:
- Preparation room
- Test room (committee)

The Trier Social Stress Test (TSST)

Protocol:
• 5 min. baseline recording

The Trier Social Stress Test (TSST)

**Protocol:**
- 5 min. baseline recording
- Presentation of the assignments by the committee

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- Presentation of the assignments by the committee
- 5 min. preparation of an oral presentation

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- 5 min. second assignment: counting backwards from 1687 in steps of 13

The Trier Social Stress Test (TSST)

Protocol:
• 5 min. baseline recording
• Presentation of the assignments by the committee
• 5 min. preparation of an oral presentation
• 5 min. oral presentation in front of the committee
• 5 min. second assignment: counting backwards from 1687 in steps of 13
• 40 min. relaxation in the preparation room

The Virtual Trier Social Stress Test (VR-TSST)

Protocol:
- 5 min. baseline recording
- Presentation of the assignments by the committee
- 5 min. preparation of an oral presentation
- 5 min. oral presentation in front of the committee
- 5 min. second assignment: counting backwards from 1687 in steps of 13
- 40 min. relaxation in the preparation room

Jönsson et al., 2010

• Architecture must be the variable
The Virtual Trier Social Stress Test (VR-TSST)

Data:

- Heart rate variability as a measure of sympathetic (SNS)- and parasympathetic (PNS) nervous system activity.
- Saliva samples as a measure of cortisol release by the HPA-axis.

- Architecture must be the variable
- Data must be physiological.

Jönsson et al., 2010
The Virtual Trier Social Stress Test (VR-TSST)

Enclosure.
Fich et al. 2014

Space with openings, potentially allowing for escape.
The Virtual Trier Social Stress Test (VR-TSST)

Results:

Solid curve = closed room
Dotted curve = open room

Fich et al. 2014
The Virtual Trier Social Stress Test (VR-TSST)

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The Virtual Trier Social Stress Test (VR-TSST)

Results:

- No part of the autonomous nervous system was sensitive to the spatial context.

Fich et al. 2014
Results:

- No part of the autonomous nervous system was sensitive to the spatial context.
- The reaction of the HPA-axis did react with a less pronounced stress reaction in the room with openings as predicted.

Fich et al. 2014
The Virtual Trier Social Stress Test (VR-TSST)

Results:

Conclusion:

• No part of the autonomous nervous system was sensitive to the spatial context.

The fight-or-flight reaction can therefore not be responsible for the effect.

Fich et al. 2014
The Virtual Trier Social Stress Test (VR-TSST)

Results:

Discussion:

We hypothesize, that the effect is due the role of the hippocampus as:

- The hippocampus is part of the HPA feed-back mechanism.
- The hippocampus is mapping space boundaries.

Fich et al. 2014
The Virtual Trier Social Stress Test (VR-TSST)

Results:

- Cortisol
- Heart rate
- SNS
- PNS

Discussion:

The difference in cortisol is most pronounced after the TSST, when the SNS reaction is terminated. It could be, that the SNS ‘counterbalances’ the reaction of the HPA-axis.

Fich et al. 2014
The Virtual Trier Social Stress Test (VR-TSST)

Discussion:

Treatment or examination in a space with potential possibilities for “escape” might result in a lower cortisol level after treatment.


THANK YOU FOR YOUR ATTENTION