CAN ARCHITECTURAL SPACE BE HEALING? A VIRTUAL STRESS EXPERIMENT

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AALBORG UNIVERSITY
DENMARK

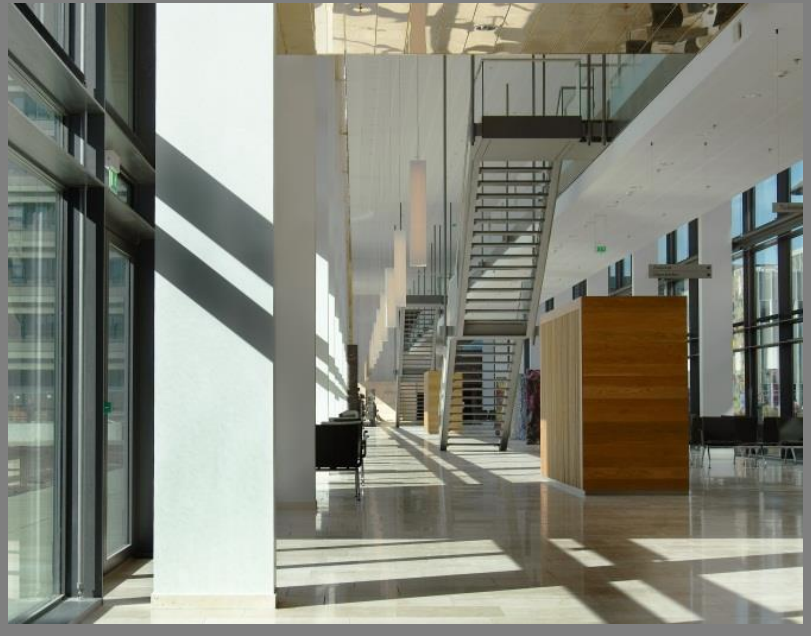
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1984 Graduated as an architect

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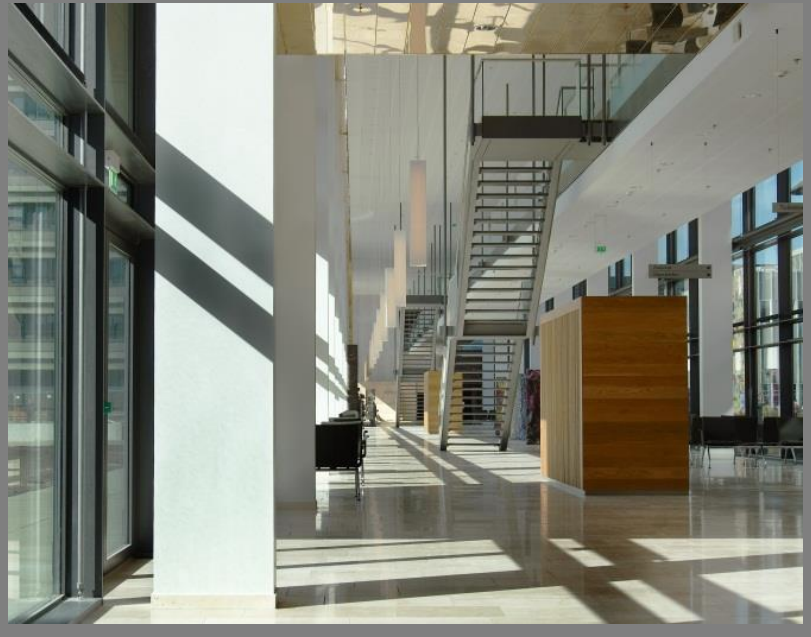


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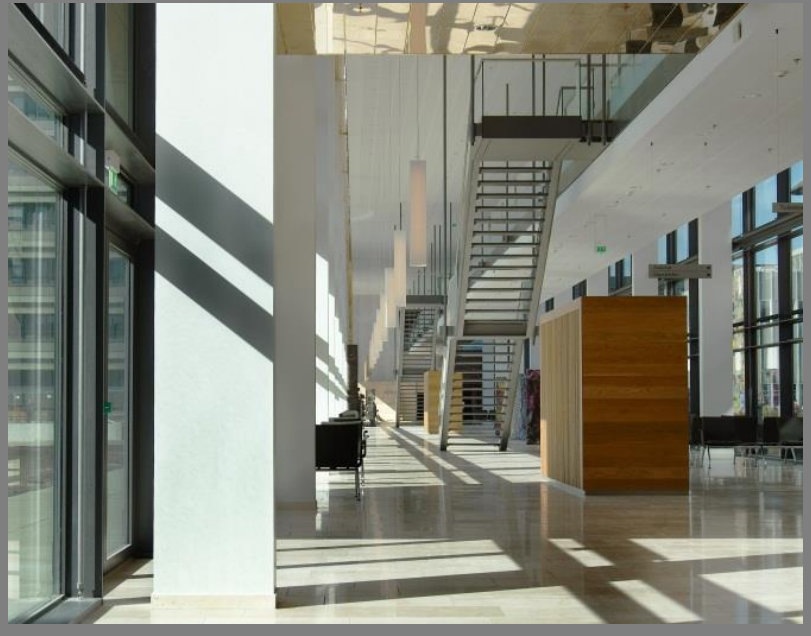


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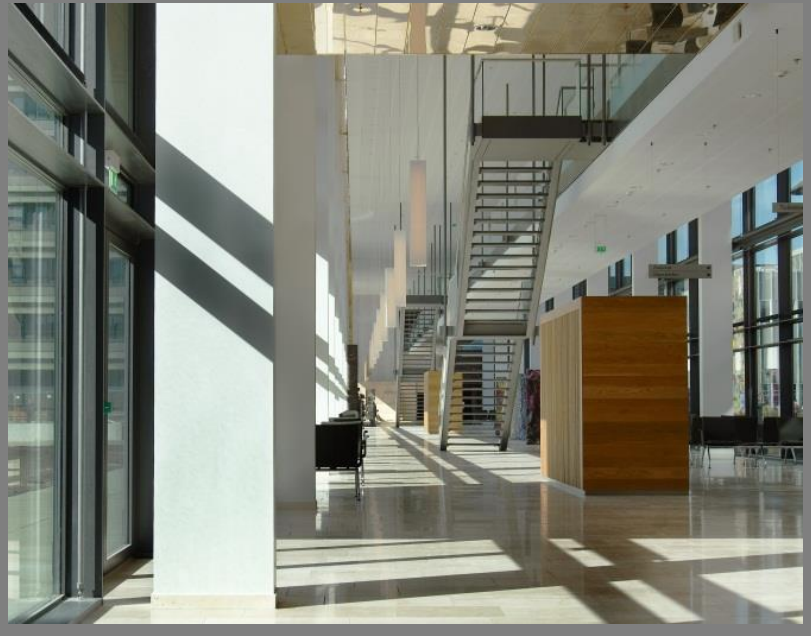
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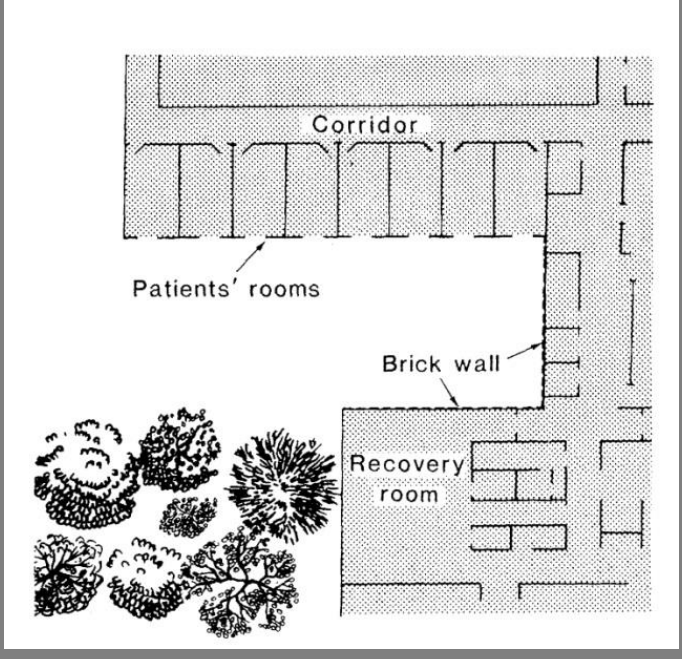


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A review report of approx.. 200 articles how hospital design might influences treatment, patient and staff safety, way-finding in hospitals etc.

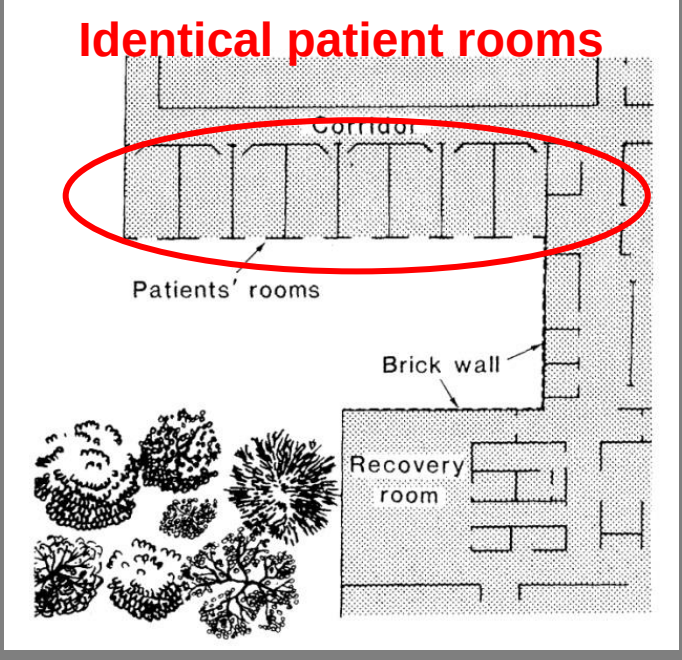
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Ulrich, 1984

Patients who had undergone gall bladder surgery

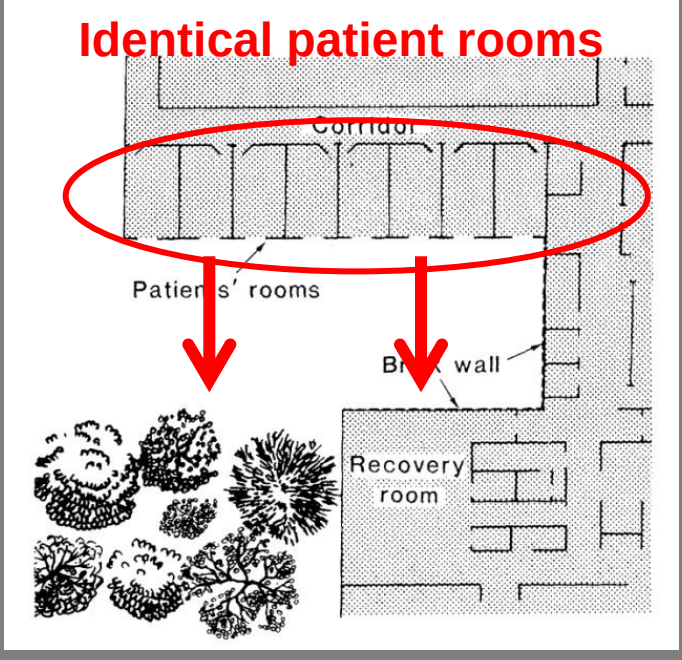
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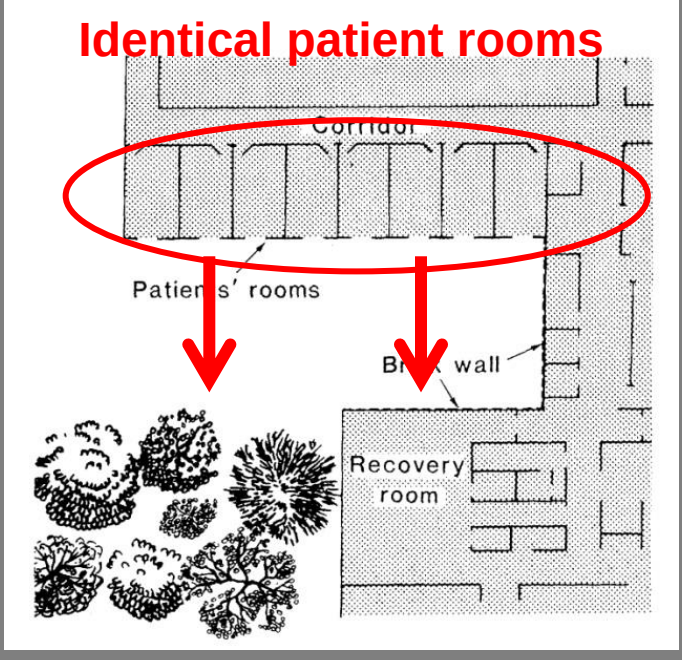
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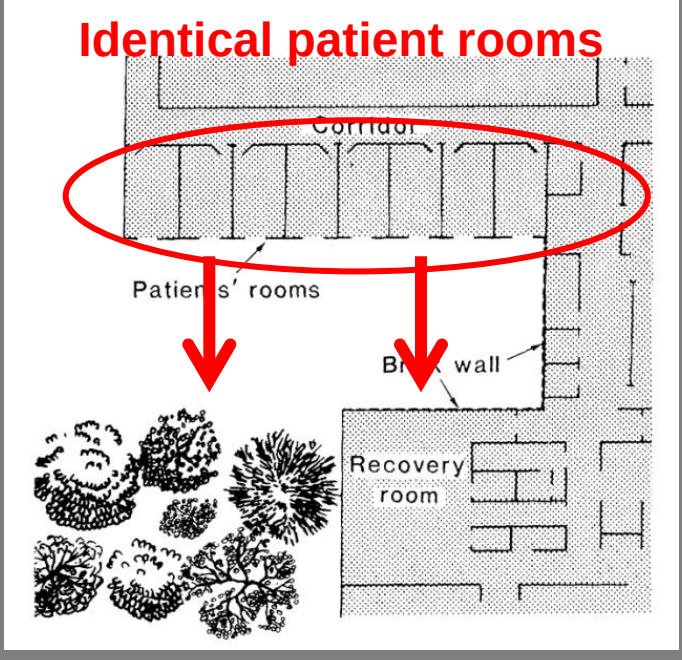
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Tree-group vs. wall-group:

Hospitalized 7.96 vs. 8.70 days

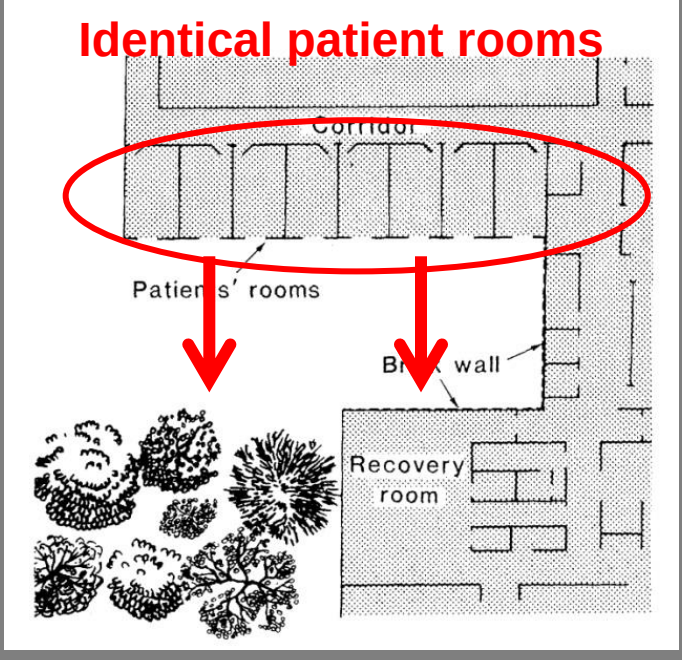
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Because the patient rooms are identical, no data about the architecture itself is produced.

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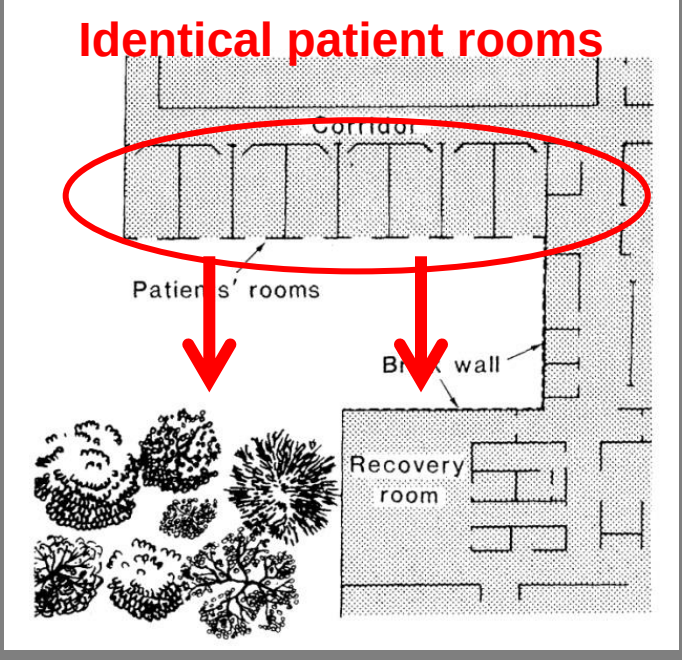


Ulrich, 1984

Because the patient rooms are identical, no data about the architecture itself is produced.

Although the effect is assumed to be connected to stress and anxiety, there is no physiological measure.

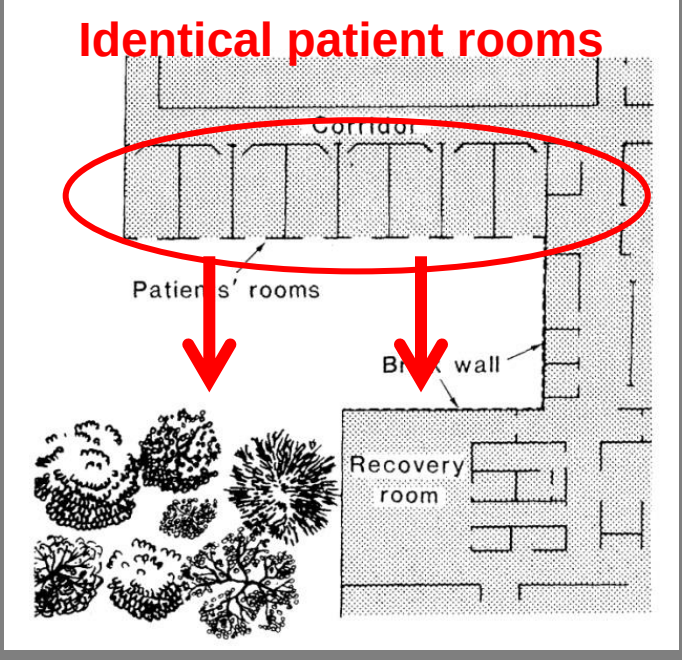
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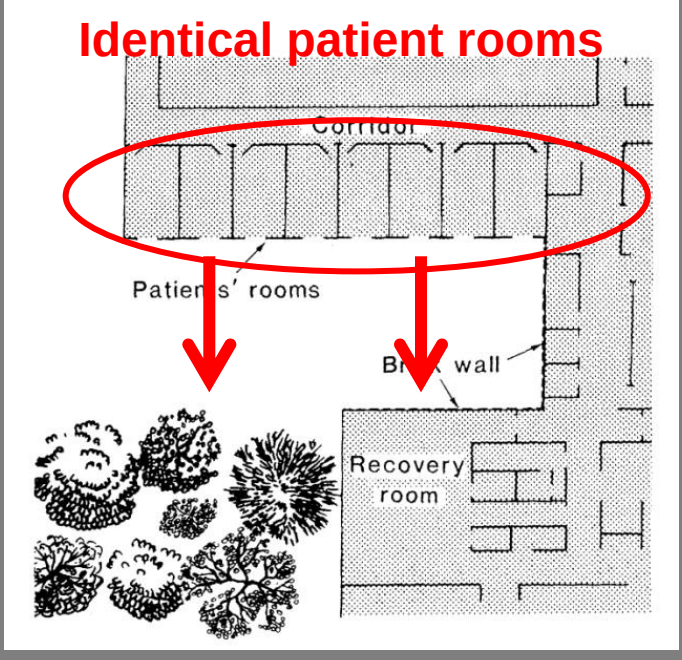


Ulrich, 1984

Can the architecture itself influence the healing process by way of the stress system?

- Architecture must be the variable

Background:



Ulrich, 1984

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)



Kirschbaum, et al.,1993.

Psychosocial stress

The Trier Social Stress Test (TSST)



Kirschbaum, et al.,1993.

Psychosocial stress

Lab set-up:

- Preparation room
- Test room (committee)

The Trier Social Stress Test (TSST)



Kirschbaum, et al.,1993.

Protocol:

- 5 min. baseline recording

The Trier Social Stress Test (TSST)



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The Trier Social Stress Test (TSST)



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The Virtual Trier Social Stress Test (VR-TSST)



- Architecture must be the variable

Jönsson et al., 2010

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The Virtual Trier Social Stress Test (VR-TSST)



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

Jönsson et al., 2010

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.

The Virtual Trier Social Stress Test (VR-TSST)



Enclosure.

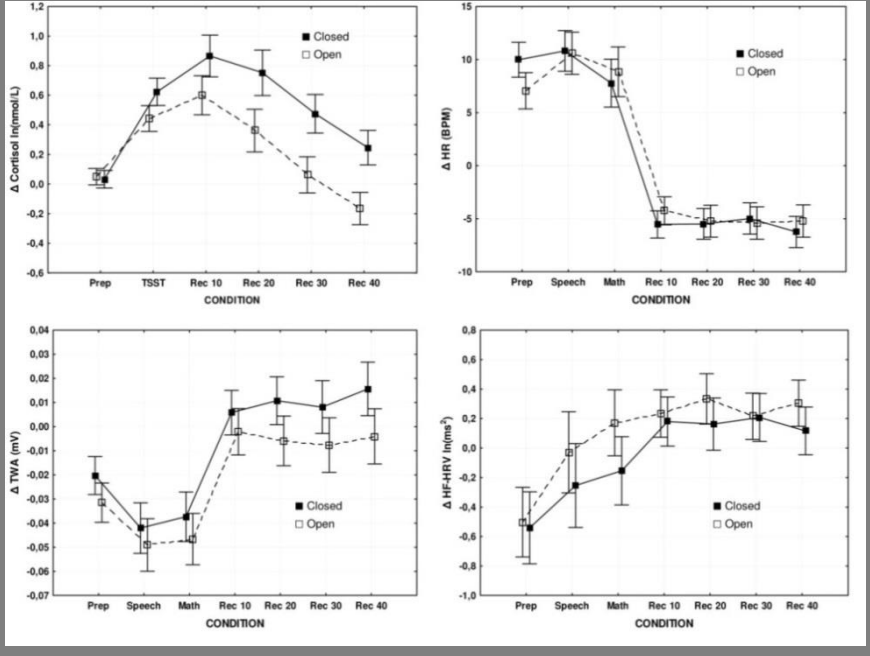


Space with openings, potentially allowing for escape.

Fich et al. 2014

The Virtual Trier Social Stress Test (VR-TSST)

Results:



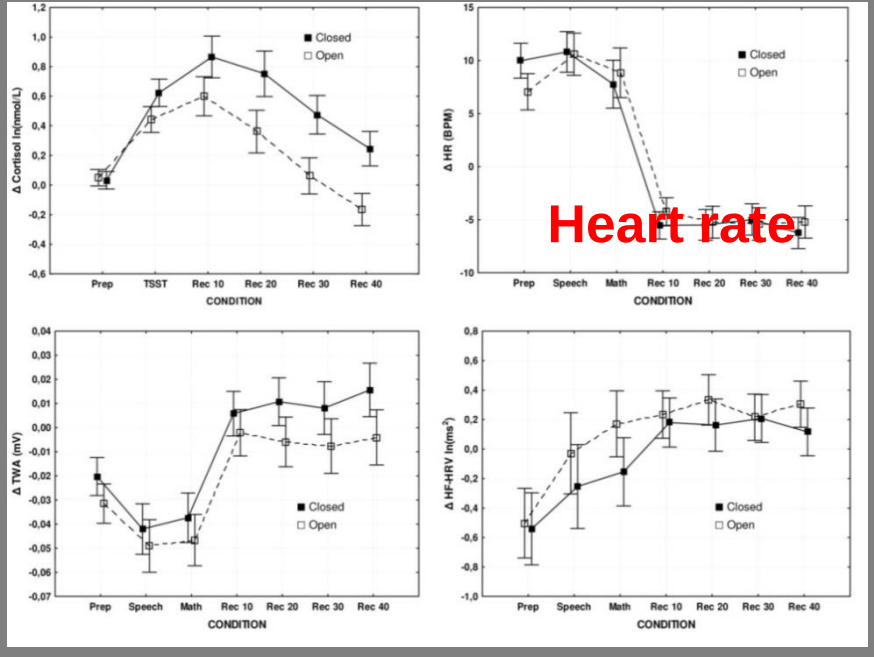
Fich et al. 2014

Solid curve = closed room

Dotted curve = open room

The Virtual Trier Social Stress Test (VR-TSST)

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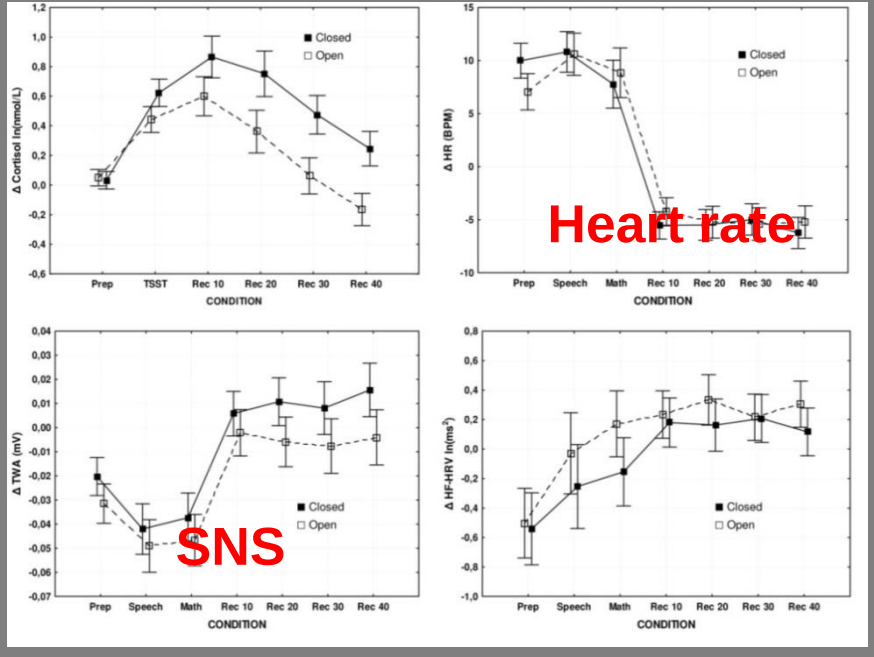
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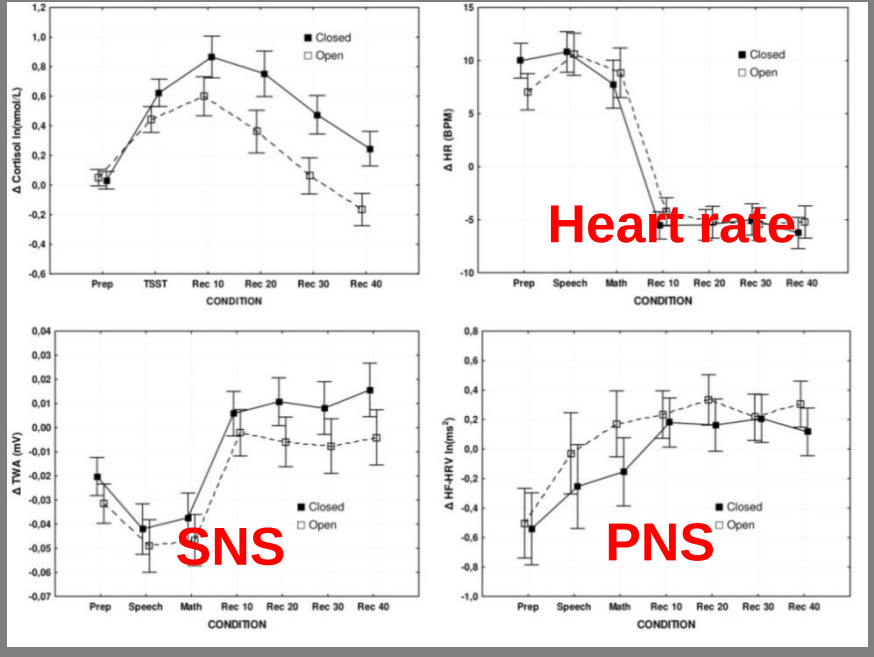
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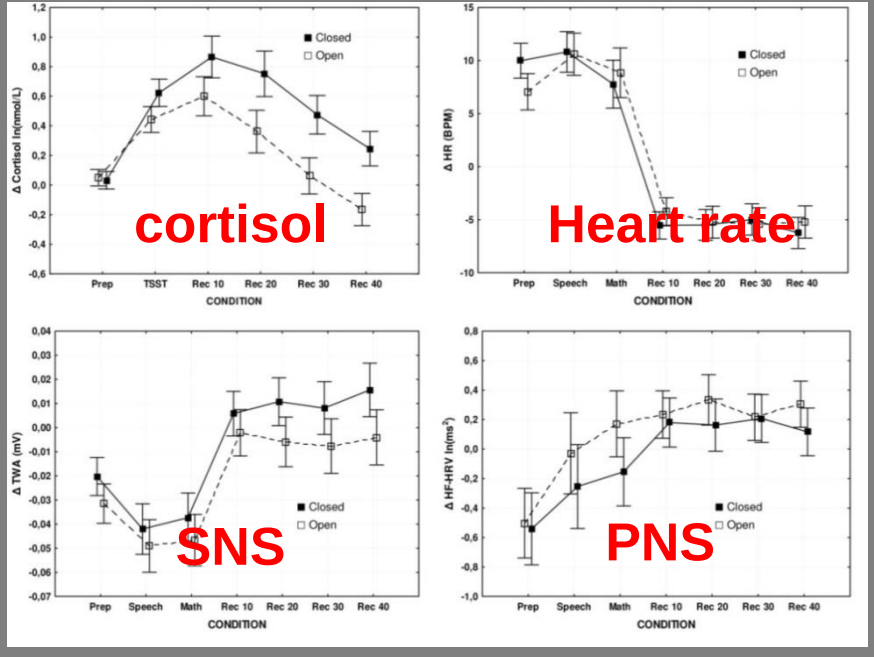
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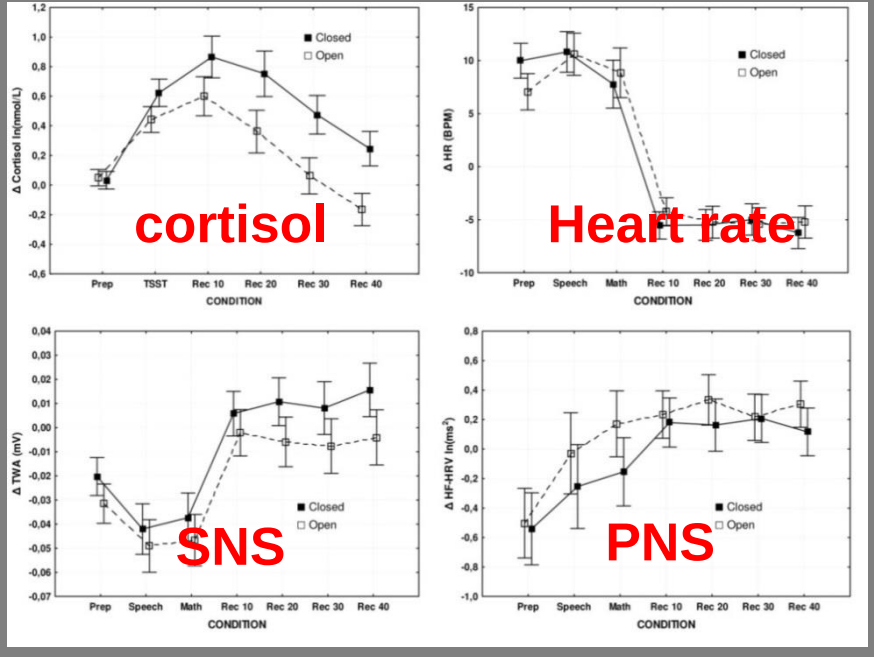
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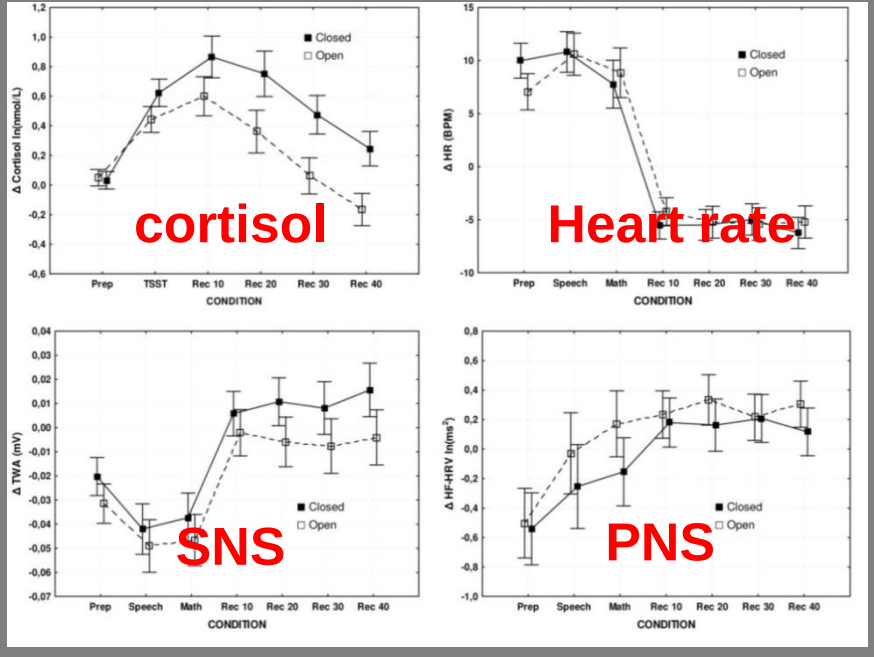
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Results:

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

The Virtual Trier Social Stress Test (VR-TSST)

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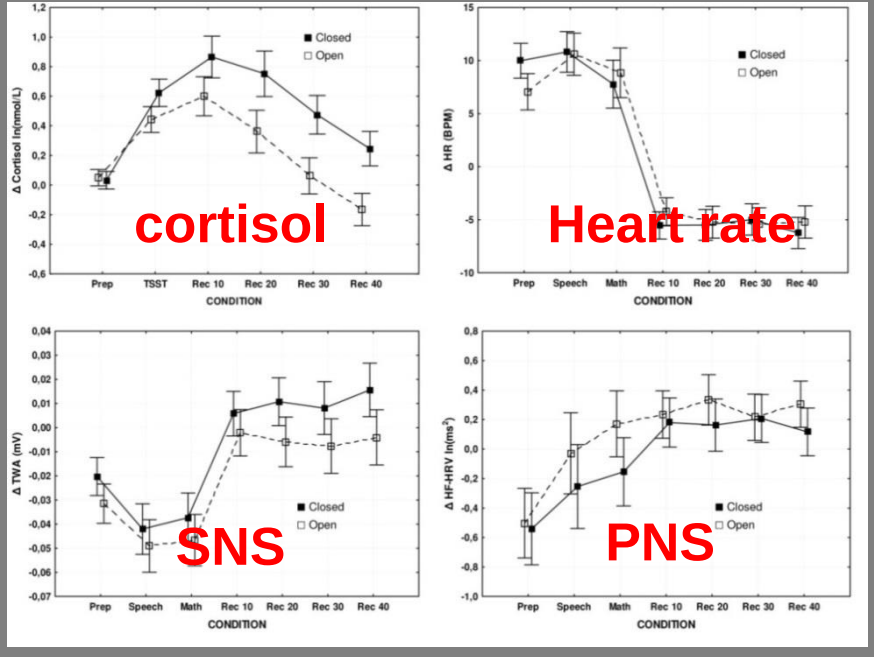
Fich et al. 2014

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.

The Virtual Trier Social Stress Test (VR-TSST)

Results:



Fich et al. 2014

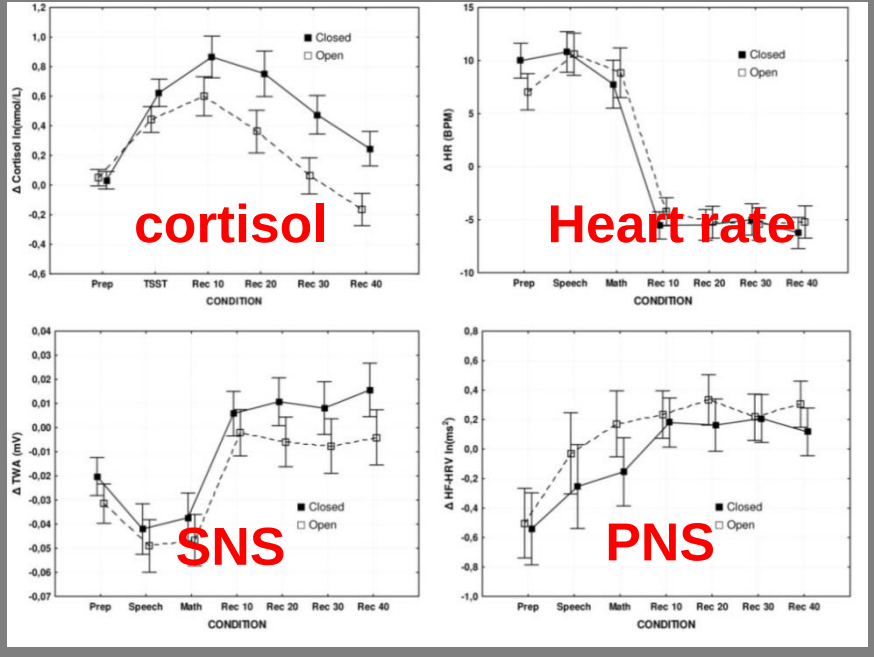
Conclusion:

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

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

The Virtual Trier Social Stress Test (VR-TSST)

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Fich et al. 2014

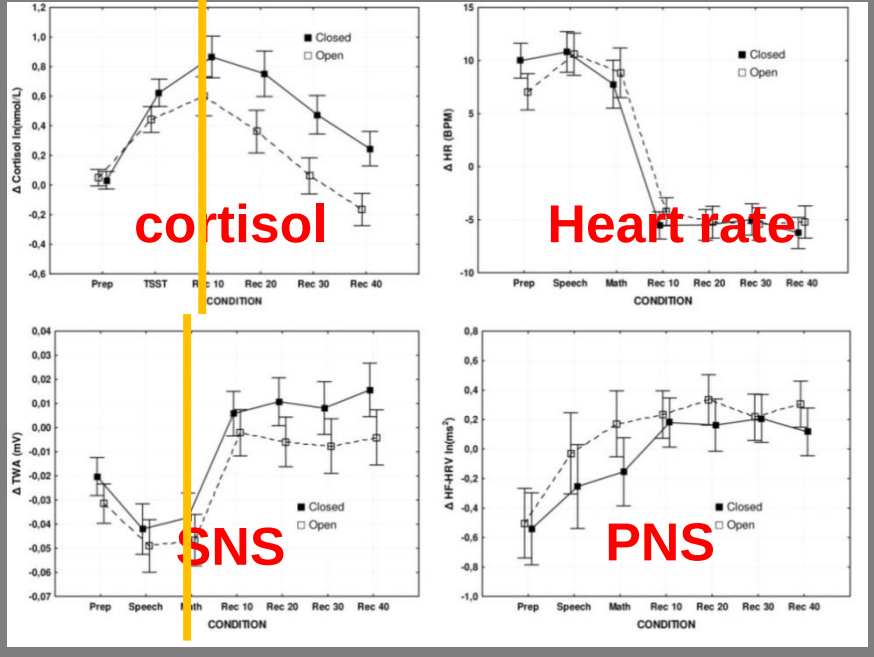
Discussion:

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.

The Virtual Trier Social Stress Test (VR-TSST)

Results:



Fich et al. 2014

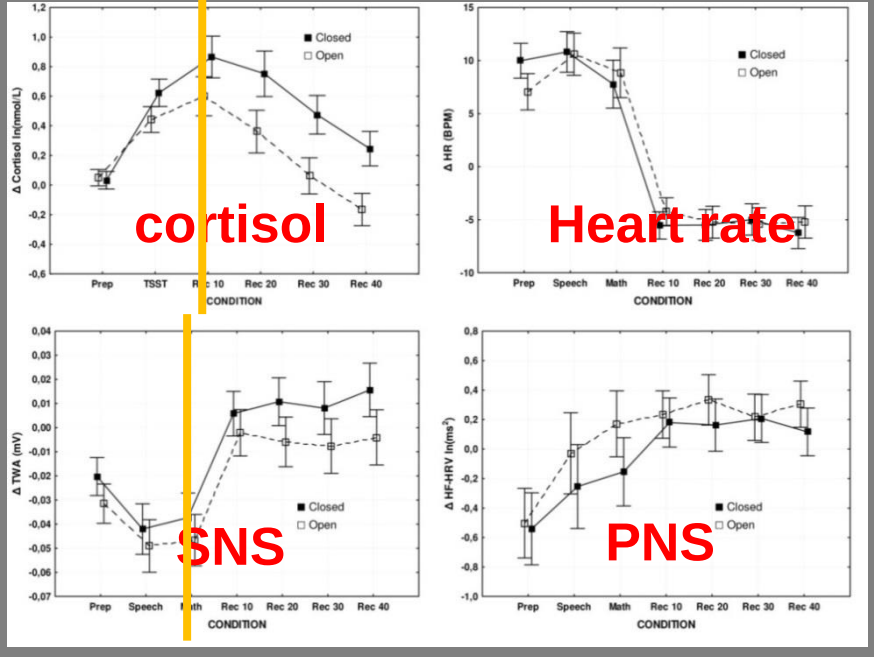
Discussion:

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.

The Virtual Trier Social Stress Test (VR-TSST)

Results:



Fich et al. 2014

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

Fich, L.B., Jönsson, P., Kirtkegaard, P.H., Wallergård, M., Garde, A.H., Hansen, Å., 2014. Can architectural design alter the physiological reaction to psychosocial stress? A virtual TSST experiment. *Physiology & Behavior* 135, pp. 91-97

Jönsson, P., Wallergård, M., Österberg, K., Hansen, Å.M., Johansson, G., Karlson, B., 2010. Cardiovascular and cortisol reactivity and habituation to a virtual reality version of the Trier Social Stress Test: A pilot study. *Psychoneuroendocrinology*, 35, 1397-1403

Kirschbaum, C., Pirke, K-M., Hellhammer, D.H., 1993. The 'Trier Social Stress Test': A Tool for Investigating Psychobiological Stress Responses in a Laboratory Setting. *Neuropsychobiology*, 28, pp. 76-88

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