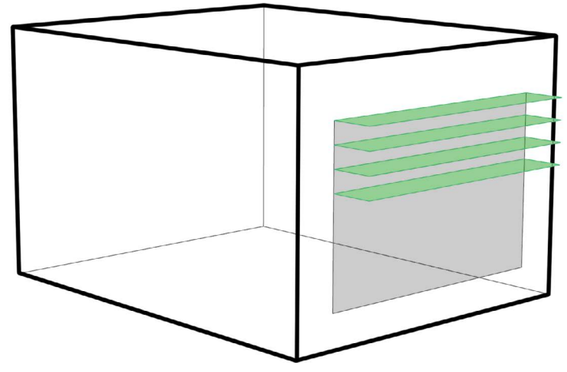
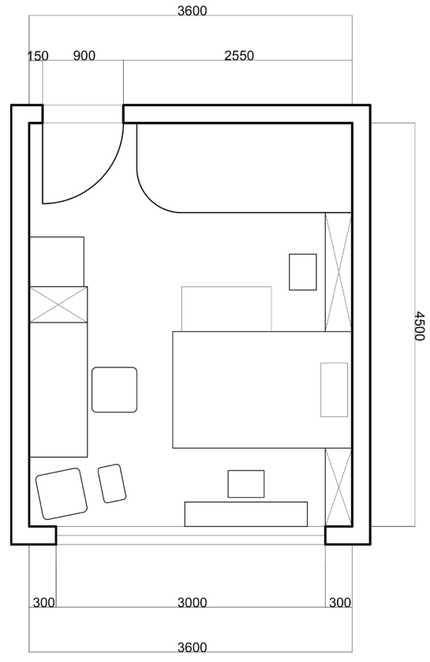
Assignment 5 Annual Daylight Analysis

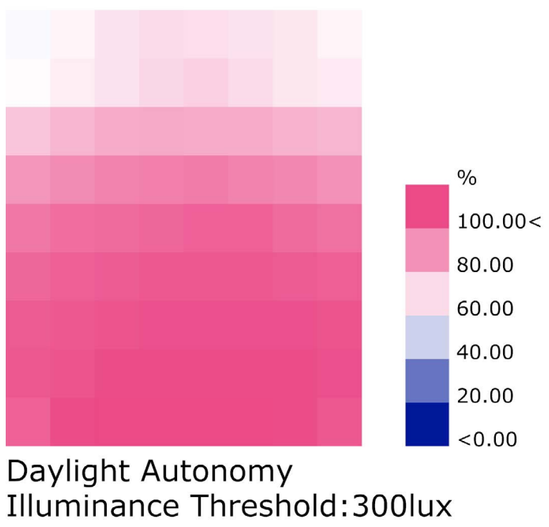
Part I_Annual Daylight Analysis_DA

Last week, I proposed a 4-layer horizontal louvers shading device for my dream room...

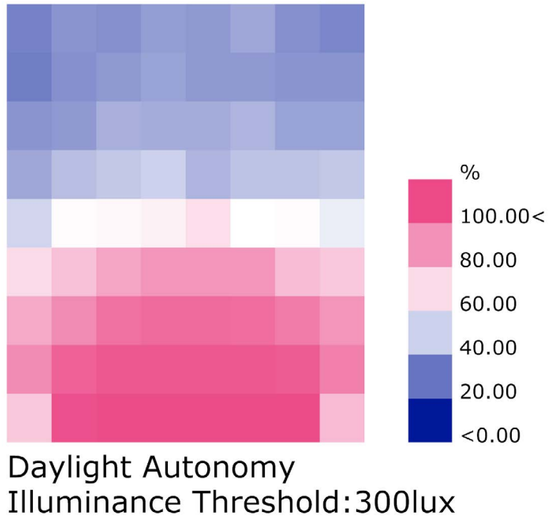




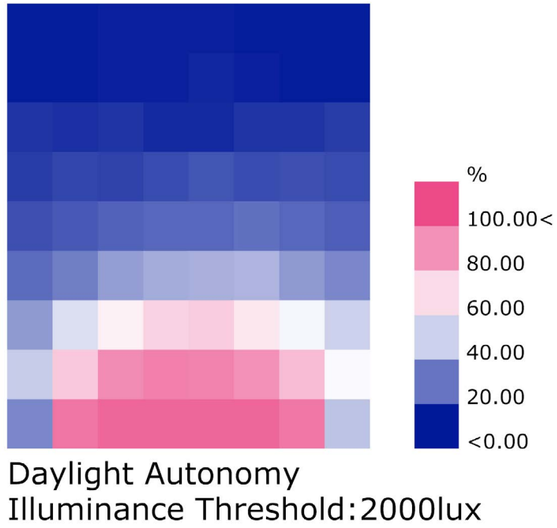
This week, firstly I analyzed the Daylight Autonomy of the room and set up the illuminance threshold as 300lux and 2000lux. I found that, after using shading device, the back of the room could receive less daylight, but it was fine because there was no need for too much light at the back of the room. And through comparing with or without shading device under the illuminance threshold is 2000lux, it is obvious that the shading device works well. But still, there is too much daylight in the area closed to the window.



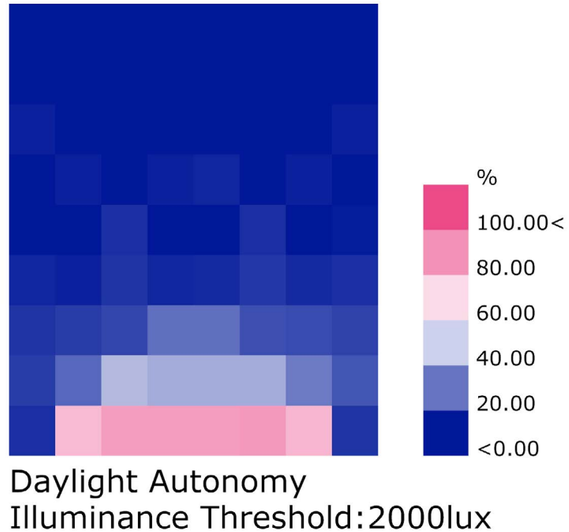
no shading device



using shading device



no shading device



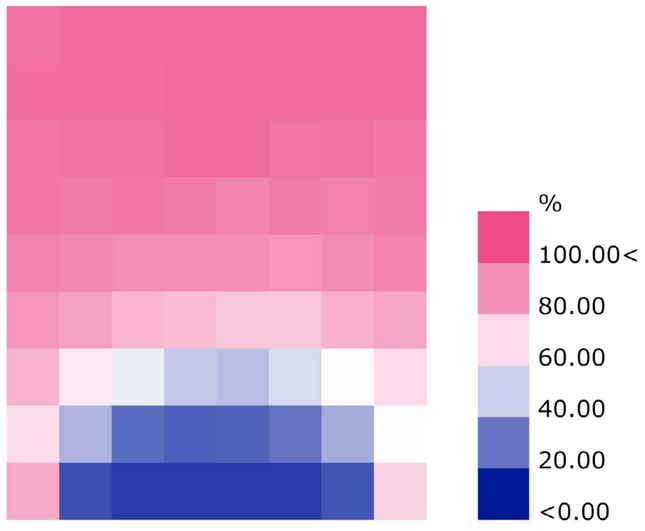
using shading device

Part I_Annual Daylight Analysis_UDI

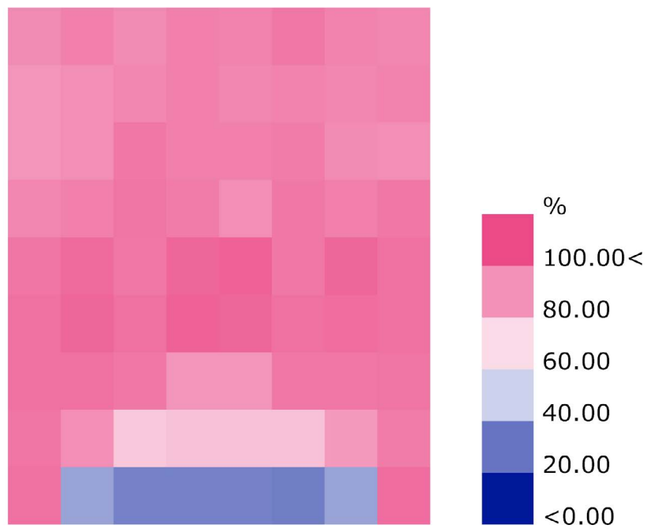
If a comfortable room means, the illuminance in more than 80% of the time is between 100-2000lux.

Without shading device, 55% of the room area is comfortable.
With shading device, 79% of the room area is comfortable.

But in the area closed to the window, people will feel comfortable only in 20% of the time. And that is the point I need to improve.



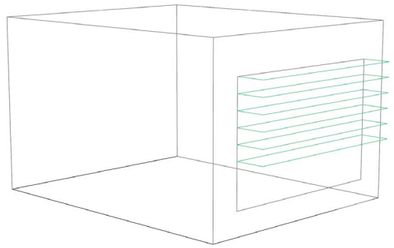
no shading device

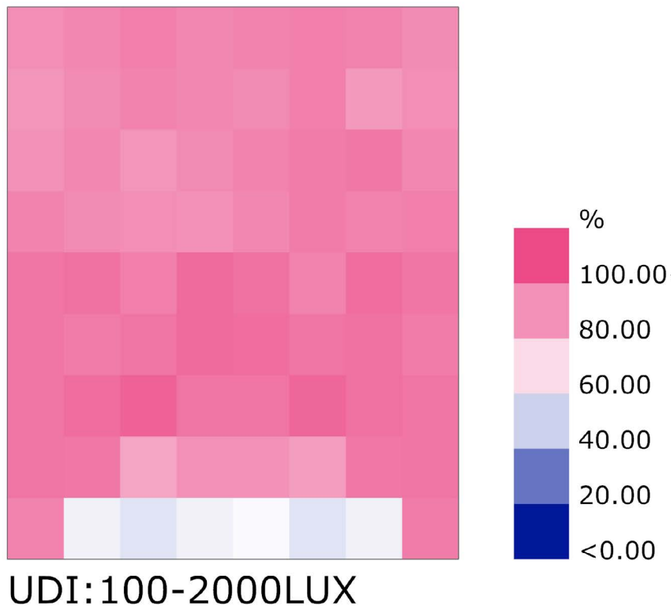


using shading device

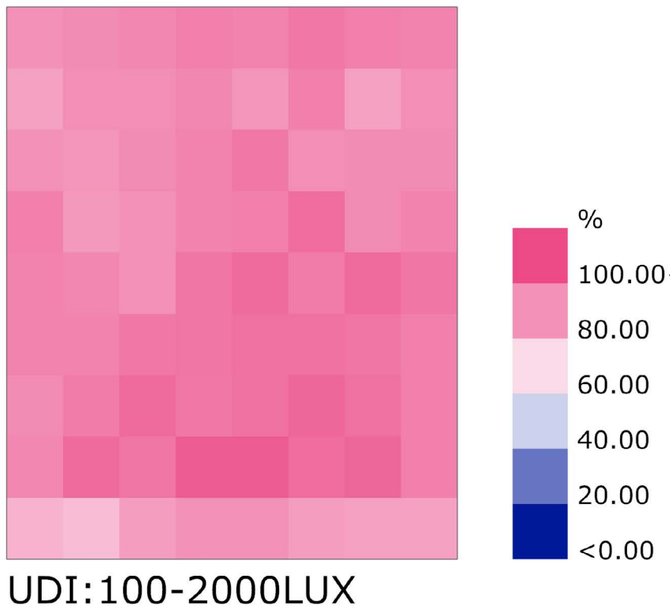
Part II_Improve the shading device

Test 1
If more layers are added to the shading device...





Add one layer of the shading panel



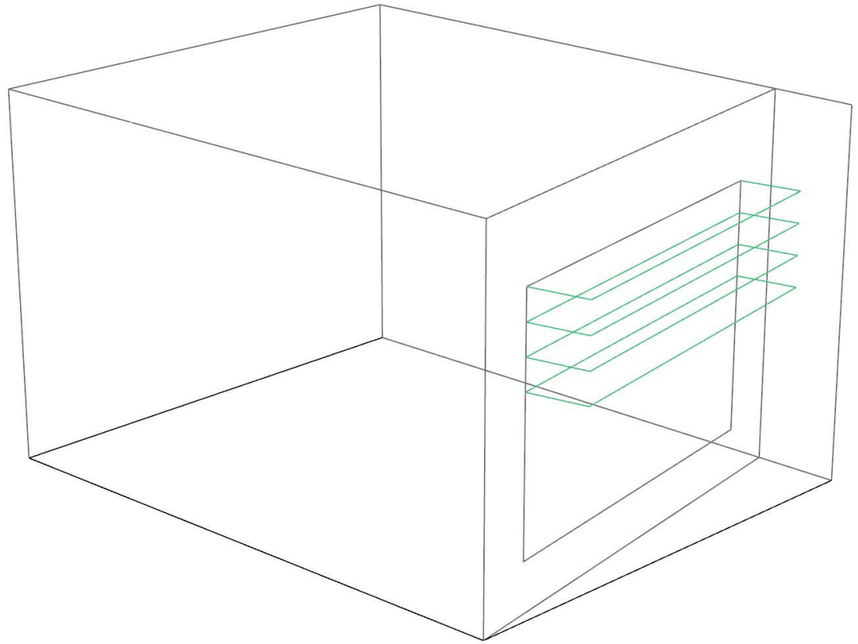
Add two layers of the shading panel

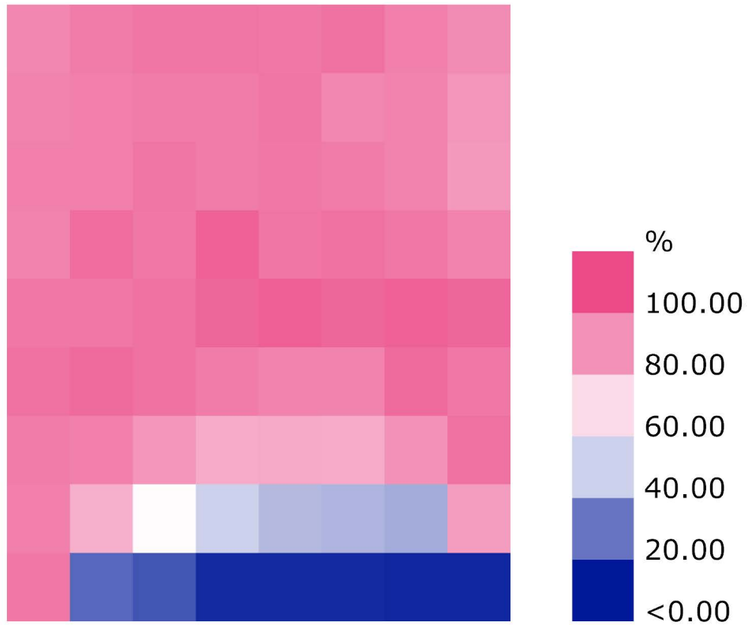
Conclusion

Adding layers of shading panel could increase UDI. When two layers are added to the original 4-layer shading device, 98% of the room area could receive 100-2000lux illuminance in more than 70% of the time, which improves a lot.

Part II_Improve the shading device

Test 2
If changing orientation of the window...



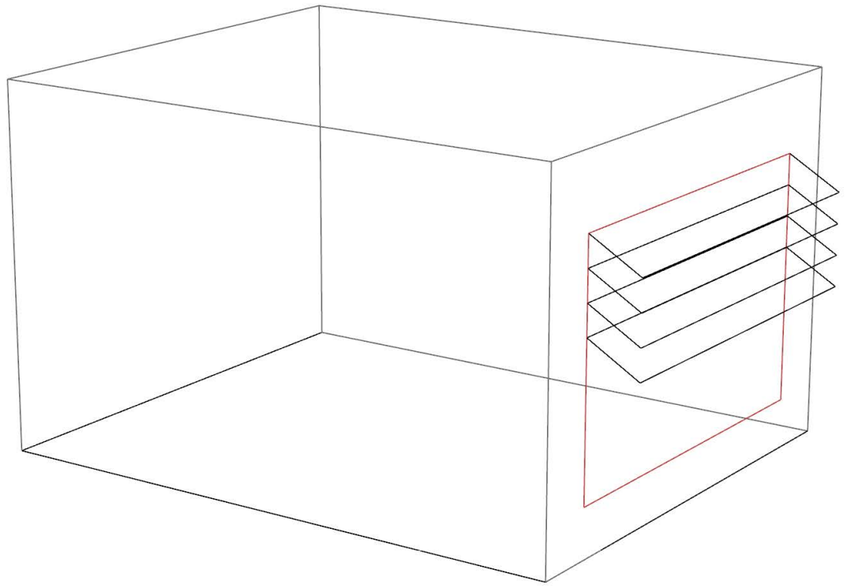


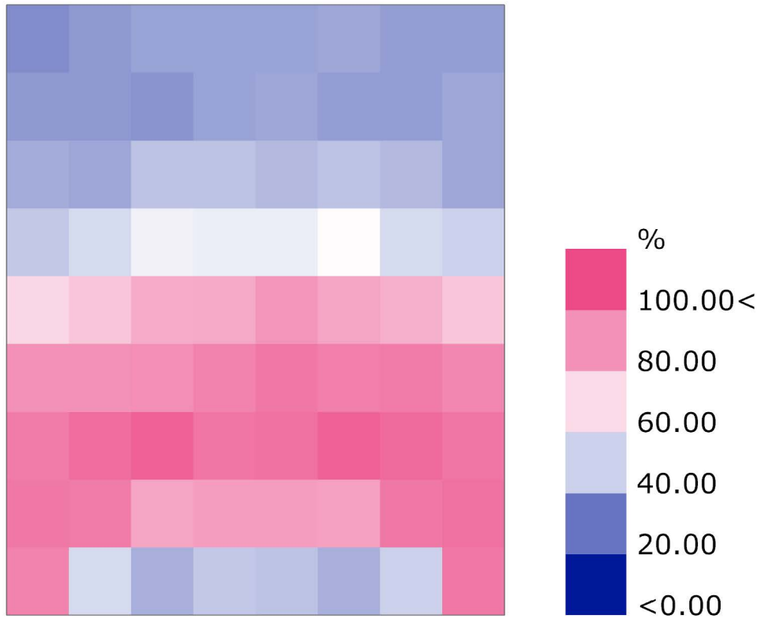
Conclusion

If orientation of the window is changed, the UDI is lower than the original shading device. So changing window’s orientation doesn’t work well.

Part II_Improve the shading device

Test 3
If changing angle of the shading panel...





UDI:100-2000LUX

Conclusion

If angle of the window is changed, there is still too much daylight in the area closed to the window; but for the back of the room, there is not enough light. So it doesn't solve the problem.