



Bamberg – Perth: 14 000km

The World Heritage Town is located in southern Germany in the north of Bavaria. It is a good example of a central European town with a basically early medieval plan and many surviving ecclesiastical and secular buildings of the medieval period. When Henry II, Duke of Bavaria, became King of Germany in 1007 he made Bamberg the seat of a bishopric, intended to become a “second Rome”.

COME TO YOUR SENSES – sensual architecture for people with cognitive risks

ADI, Annual Conference 2015, Perth



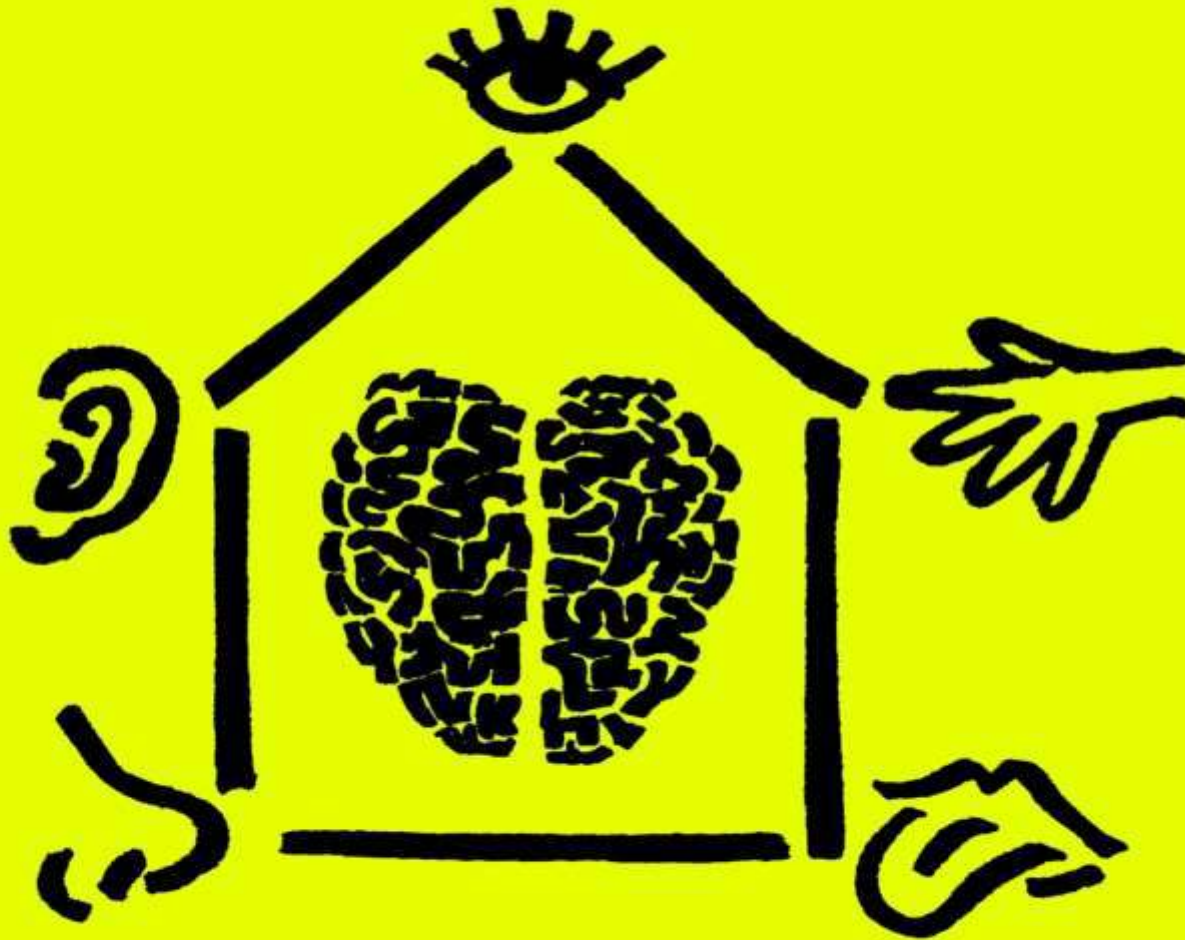
Dr. Ing. **Birgit Dietz**, Architect

I am a German architect and working for the Bavarian Institute of Architecture for the elderly and cognitively impaired and also for Hcf – health-care-facilities located in Bamberg. I teach “Hospital and health care architecture” at the Technical University Munich.

Member of the German DIN standards committee (DIN 13080)

Member of the EDK (committee of experts in DIN hospital construction standards)

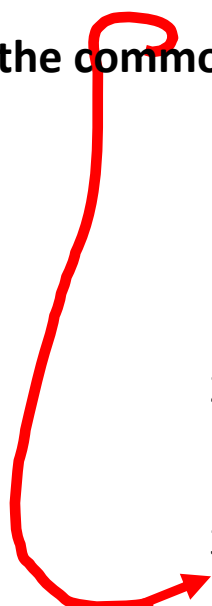




The five traditionally recognized methods of perception are sound, sight, touch, smell and taste

the common thread

1. Cognitive impairment and dementia
2. Worst case: hospitals
3. What to do now





the common thread

1. Cognitive impairment and dementia with a focus on seeing and hearing
2. Worst case: hospitals
3. What to do now

Body changes with age

- sensory changes
 - sight
 - hearing
 - touch
 - smell/taste
- Physical abilities changes
 - mobility
 - strength
 - dexterity
- mental abilities changes
 - memory
 - processing of information
 - reactions
 - coordination



Modularer
Alterssimulationsanzug^{extra} (MAX)

Taste and Smell

Number of taste buds decrease and lose mass

Loss of nerve endings in the nose

Speeding up the loss: smoking, medicine, pollution of the air e.g.

For safety: gas protector, fire detector e.g. but still:
Less information about where you are!

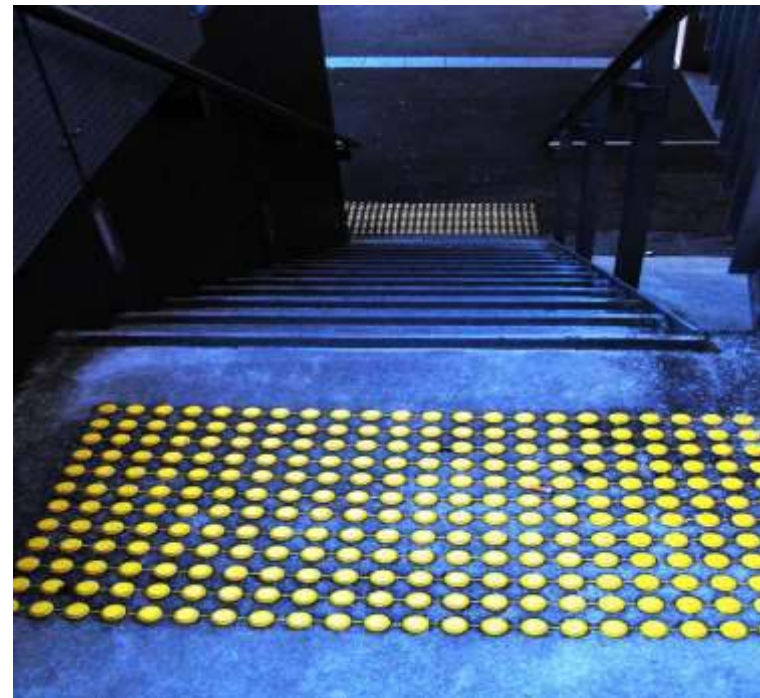


Touch, Vibration, Pain

- Skin changes (sun, wind, heat, cold)
- Poor blood circulation
- Skin and nerve damage caused by diabetes or other diseases
- Certain drugs and medical treatments

Effects : missing information i.g. „Warm“ or „Cold“?

Less information about where you are !



**Perception of environment is about 85% visual,
about 10% auditory (adults)**

Hearing

- The auditory threshold for spoken frequencies continuously increases with age. Especially high frequencies can't be perceived (inner ear).
- lessened flexibility of the tympanic membrane (middle ear)
- pinna loses flexibility, hairs become stiffer, more ear wax (outer ear)



„Unnecessary noise then, is the most cruel absence of care which can be inflicted on sick or well.”

Florence Nightingale

Hearing

Effects of noise:

- Being hard of hearing limits communication skills. The result is i.g. less cooperation, aggression and refusal, as well as isolation.
- Hearing less usually means limited awareness.
- there is a health risk with continuous loads from 65 dB on (increasing risk for cardiovascular disease)
- starting at 40 dB sleep quality is usually reduced
- Not understanding where sounds come from results in insecurity
- Even total silence can torment



**Perception of environment is about 85% visual, about 10% auditory
(adults)**

Seeing

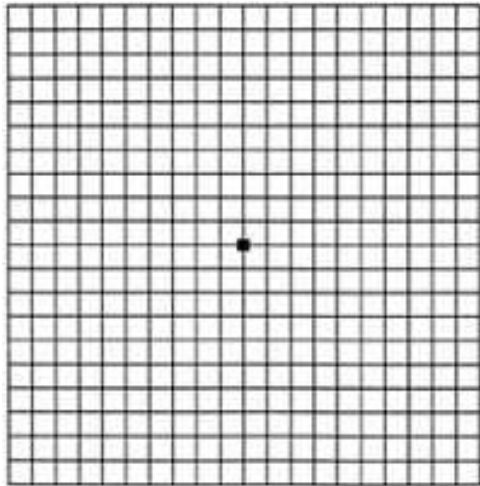
Diseases which aggravate the problem e.g.

- presbyopia
- age dependent miosis
- Blepharochalasis (hanging eye lashes)
- cataract
- age-related macular degeneration (AMD)
- glaucoma
- diabetic retinopathy

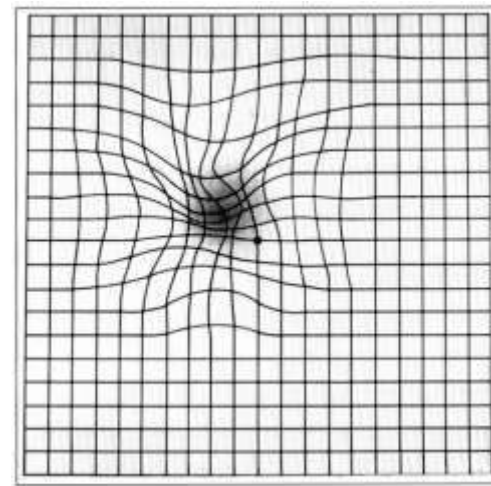


AMD – age related macular degeneration

1 in 5 Germans between the ages of 65 and 74 suffer from AMD and
1 in 3 of those 75 or over



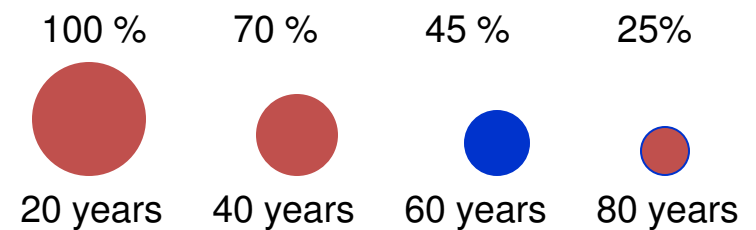
Amsler Grid
normal field of vision



Field of vision with AMD

The size of the pupil reduces with age
the surroundings seem darker
the need for light increases

due to reduction in size the
depth of field is poorly regulated



Need for light

The transmission properties of the lens are reduced more slowly for longwaved red light than for the short waved blue light.

Appropriate lighting therefore means intensifying the blue-white end of the spectrum.

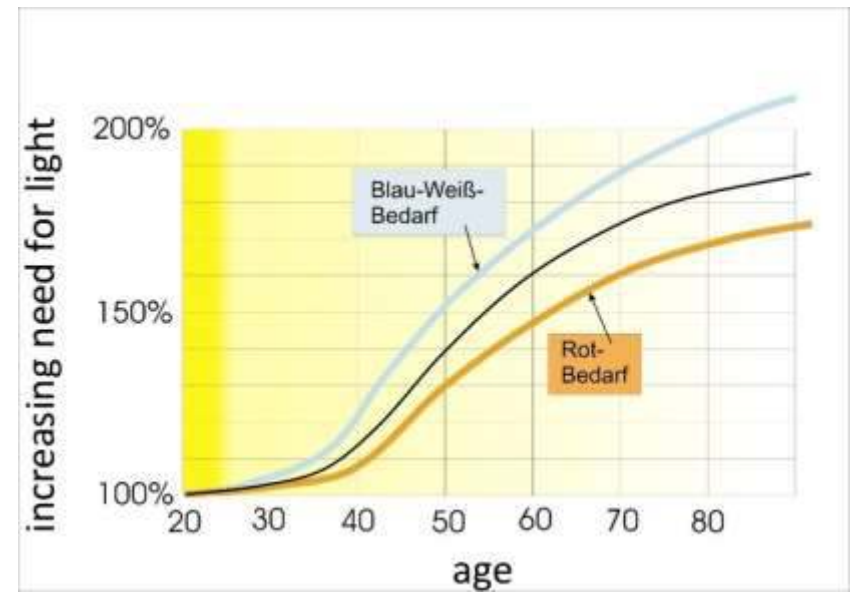
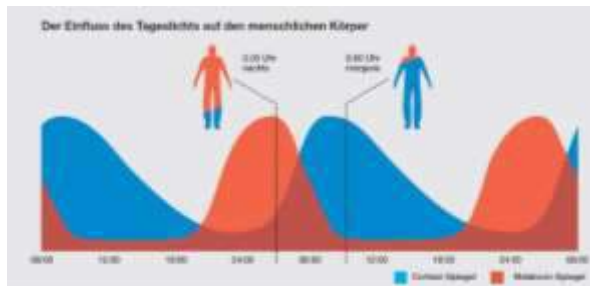


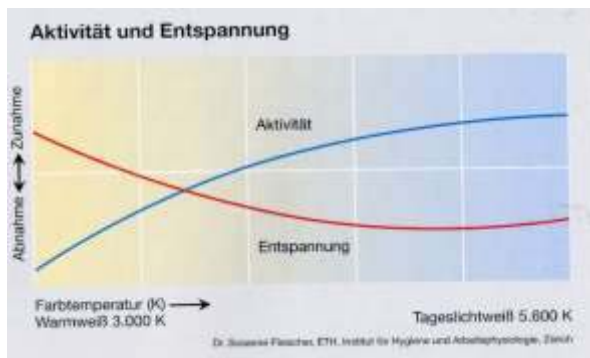
Figure: Dr. Walter Witting, Bartenbach LichtLabor)

Lighting with biological function



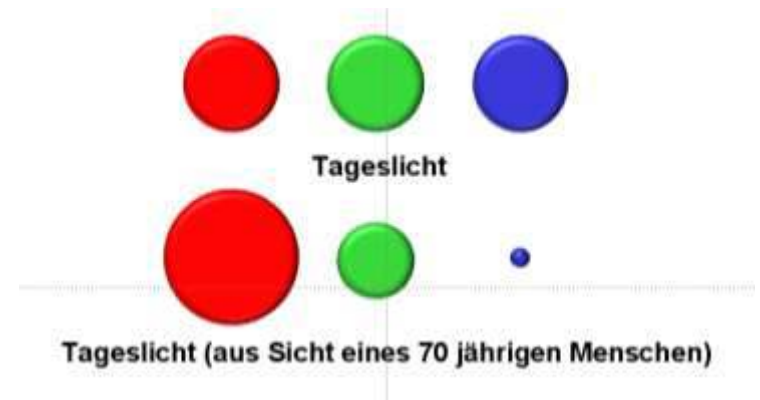
(Grafik: licht.de)

For activity and relaxation



colour vision

The colours green-blue-violet fade,
yellow – orange – red remain easy to distinguish



**With colour 3D:
Depth perception is reduced**

Long waved red light is less defracted
and more concentrated behind the retina, the image becomes
low contrast

Short waved blue light is more defracted.
The focus within the eye is in front of the retina, which makes it
shortsighted

chromatische

aberration

Perception of environment 85% visual

symptoms with old age could be e.g.

- reduced visual resolution
- increased glaring effects
- reduced colour vision
- reduced sensitivity to contrasts
- loss of peripheral vision
- central visual loss

But our new buildings are like this:



Universitätsklinikum Hamburg-Eppendorf



Zentralspital Baar, CH



Casa di Cura p., Roma

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The sense of balance is also affected

Less information about where you are!

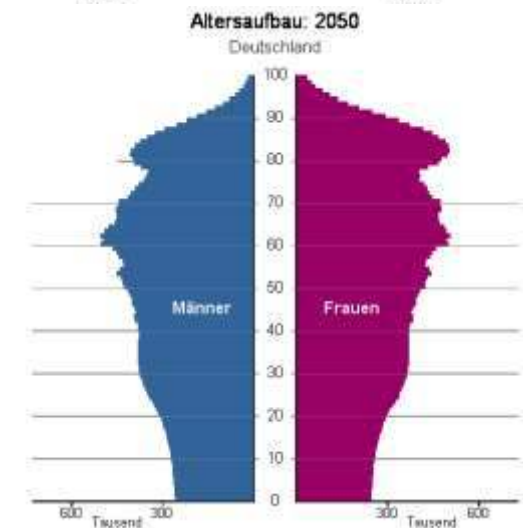
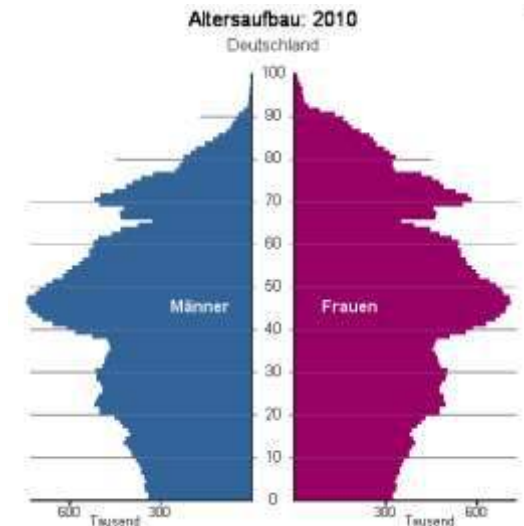


Memory performance

Even mental performance is decreased and so is information processing speed.

And: the WHO quotes 35.6 million people are afflicted with dementia which is expected to double by 2030.

In Germany there are probably 1.4 million affected and by 2050 we expect this to increase to approximately 3 million - 70% of whom are women.



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If the senses can no longer „read“ the environment and the memory can no longer retain previously known patterns ("Last in – first out"), the result is fear.



the common thread

1. Cognitive impairment and dementia
2. Worst case: hospitals
3. What to do now

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Dementia patients are over represented in German hospital populations compared to the general population, because they are older and stay longer.

Example: Nuremberg North General Hospital

- 60% of patients are over 65
- > 80 year age group is most rapidly increasing
- By 2020, 50% of patients will be >75
- In non-internal medical wards, 10-15% of patients have dementia
- In internal medical wards, ~30% of patients have dementia
- In geriatric wards, >35% of patients have dementia.

(Myllymäki-Neuhoff, Gerontologin, Klinikum Nürnberg Nord)



In 15 Bavarian hospitals we asked

Nurses and Carers:

- Malnourishment & malnutrition
- Problems with orientation
- Night unrest
- Falls and injuries
- Emotional outbursts
- Anxiety
- Aggression and physical intimidation
- Incontinence
- Complaints from other patients
- Attempts to run away
- Most problems occur at night when staffing levels are low

Doctors:

- Perceived few problems except for the fact that communication is difficult so diagnosis and treatment takes longer.



Current crisis!

The handling of patients who try to run (away) currently presents a very awkward predicament for nurses and carers. They need to stop the patient, but there may be legal problems associated with the actions they take. They are forced to walk a fine line!

Here are some actions they have taken:

- place patient in vests
- attach sticker with name & ward number to patient's back
- lock the door
- create an optical barrier e.g. black mat in front of door
- disguise the door with a mirror or hide the handle with a curtain
- hang a bell on the door as an alarm
- sedate the patient
- raise the side rails on the bed



Financial considerations

- Treating cognitively impaired patients costs more:
 - their length of stay is, on average, 3-4 days more
 - they require more time with more nurses or carers
 - compared to a similar cognitively competent patient, their stay will cost ~ Euro 1000 more.
- many people recognise the need for change, but do not know what to do.
- management is currently reluctant to change because of the cost and other programs being given higher priority.



For the people with dementia the world is falling into pieces,
especially patterns in seeing and hearing could no longer be identified



„I won't walk through this graveyard“

„Shards of glass“



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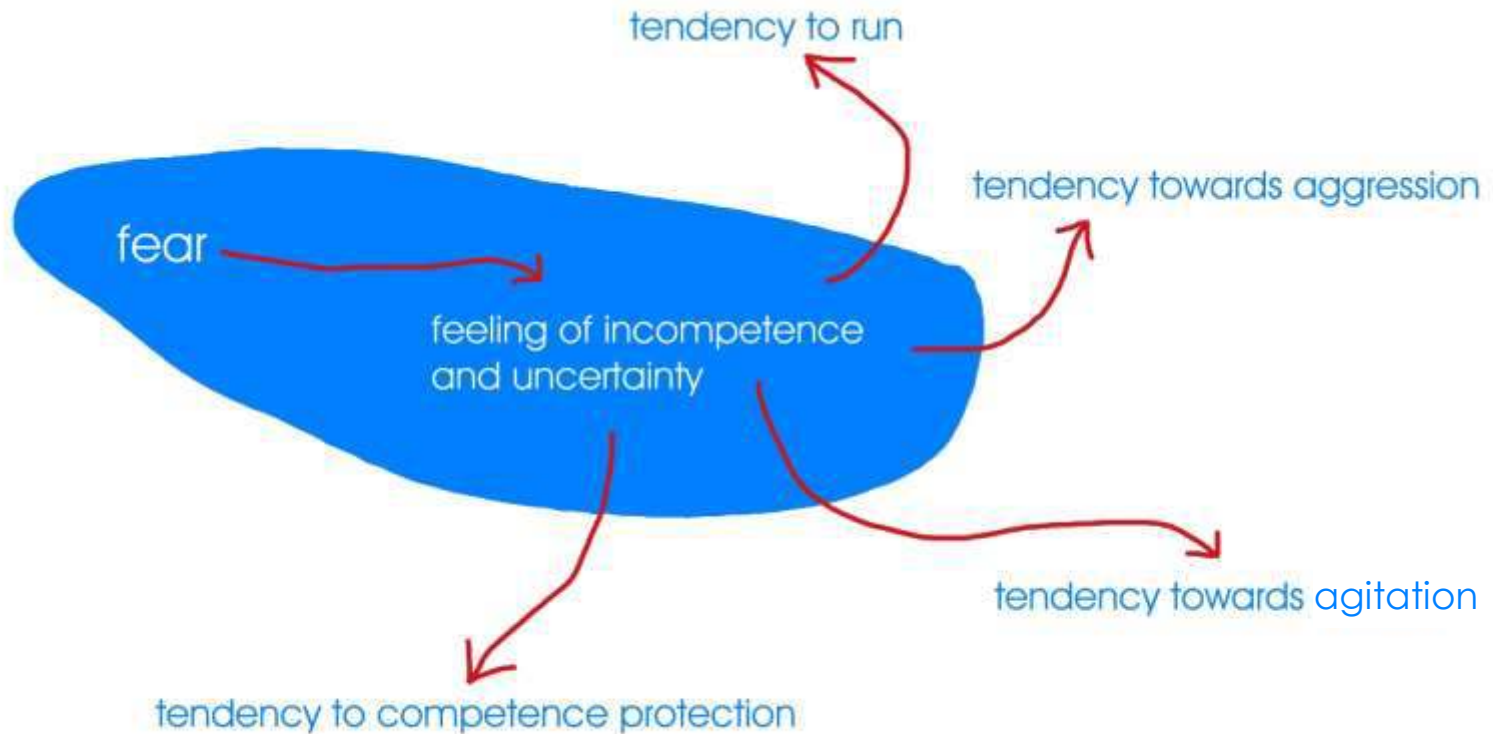


... emergency exit ... ?

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the common thread

1. Cognitive impairment and dementia
2. Examples from hospitals
3. **What to do now**

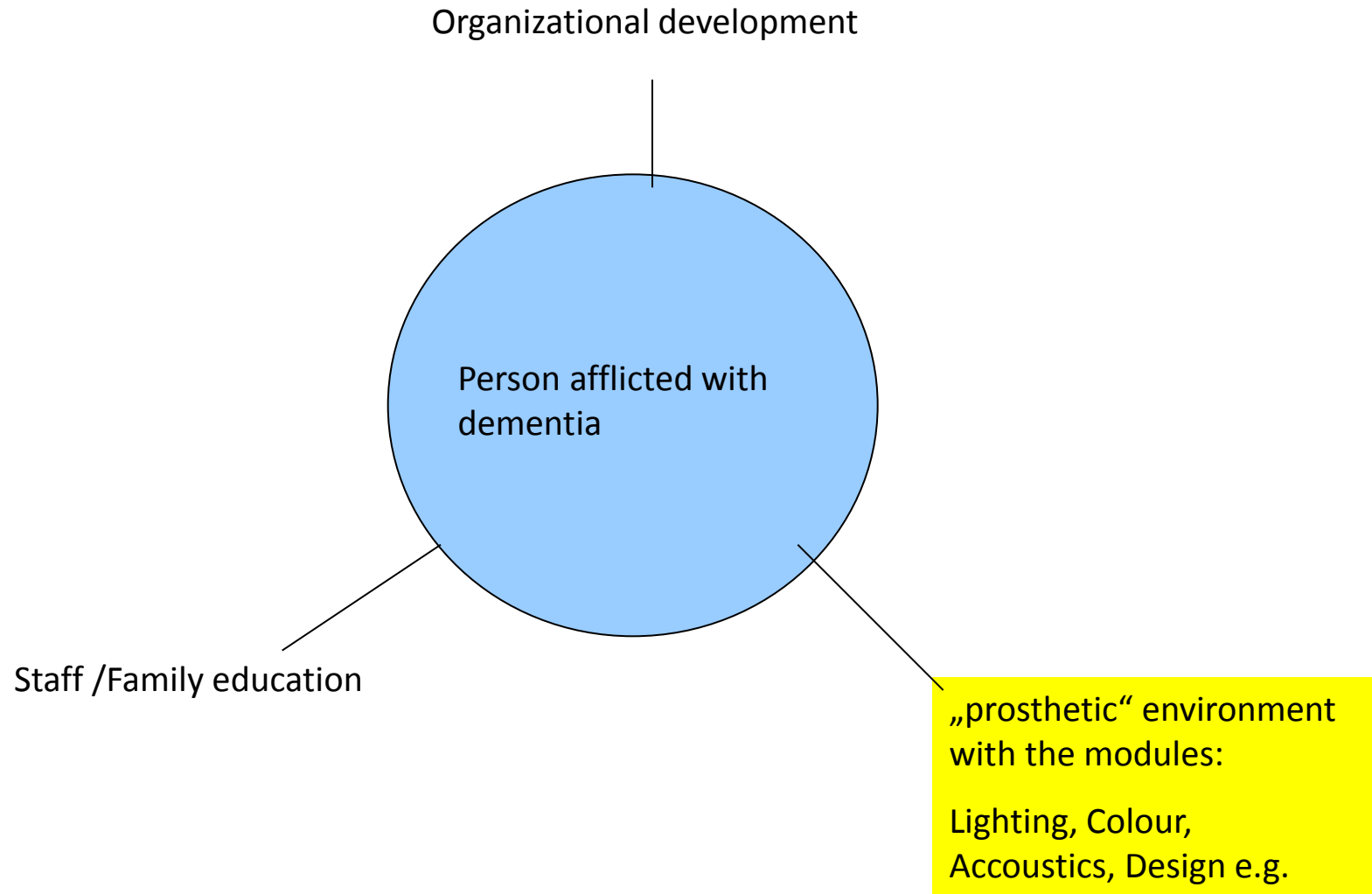
Change of view:

what are elderly people asking for?

independence, participation, identity

- familiar and „prosthetic“ environment
- minimise the need for making decisions
- uncomplicated light switches, taps i.g.





Lighting

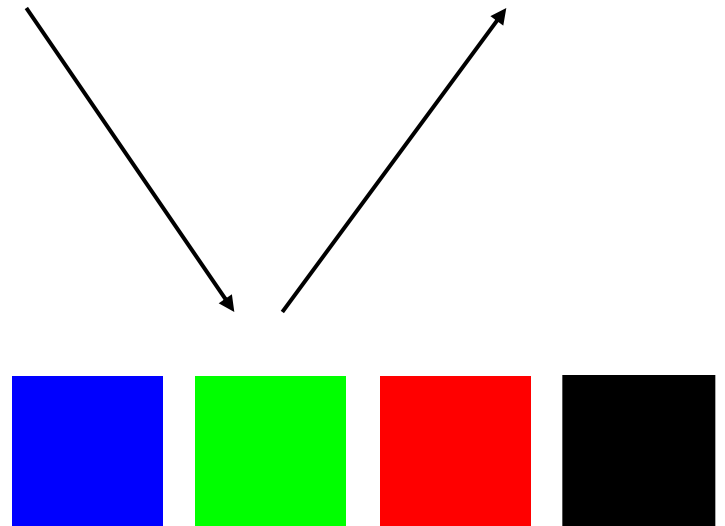
- Light with **visual function**
- Light with **emotional function**
- Light with **biological function**





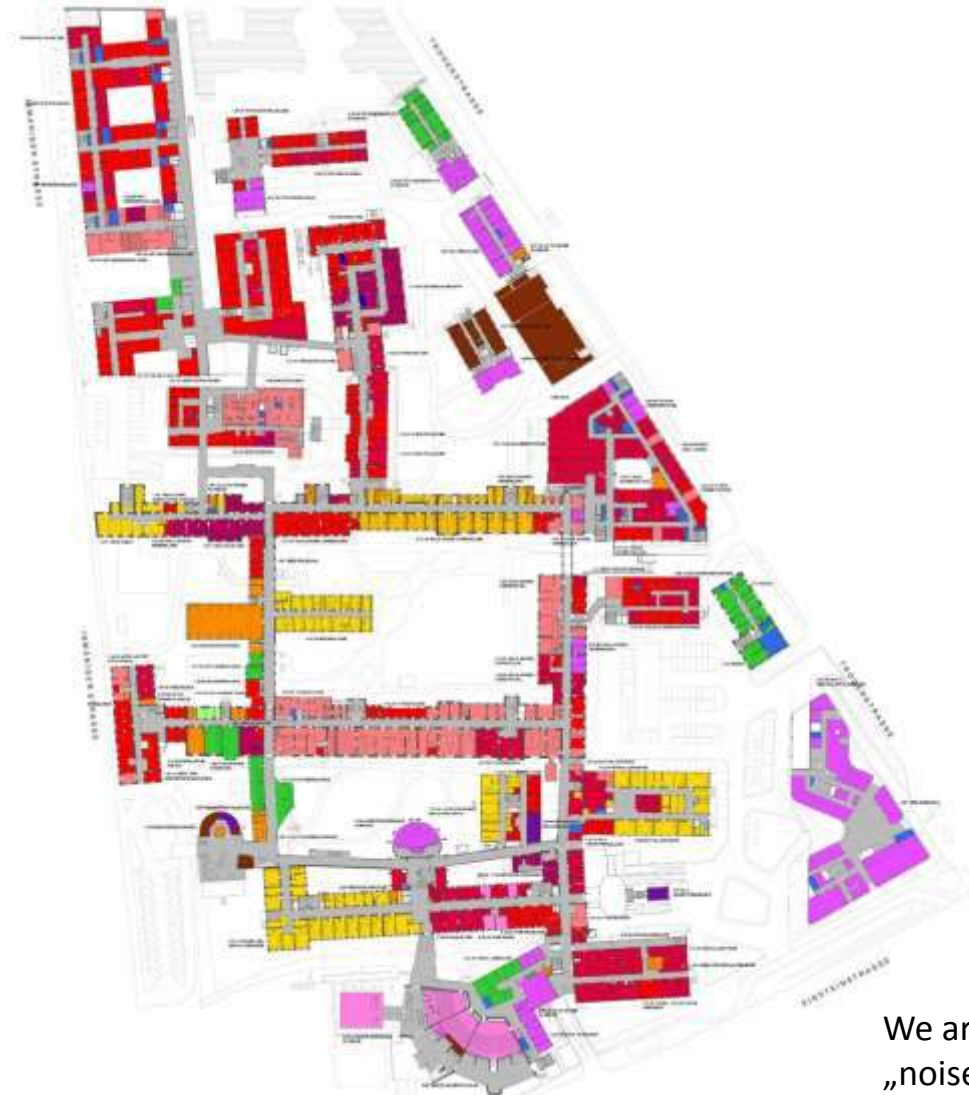
Colour

- Colour as a **barrier**
- Colour for **orientation**
- Colour for **wellbeing**



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Accoustics

- Communication
- Noise limitation
- Orientation

We are working on „noise maps“

Design

- familiarity
- functionality
- hygienic



Example: toilet



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The first colour we recognise is red.

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Therefore we marked things to support the independent use of the bathroom.





Some things did not work



... but others did very well!

EXAMPLE bathroom

Let us assume:

800-bed hospital with 420 bathrooms

70 % occupation

560 patients with use 6 times daily

Estimation:

560 patients x 330 days = 185,000 days x 6 uses =
1,110,000 uses yearly, of which 20% will need
assistance.

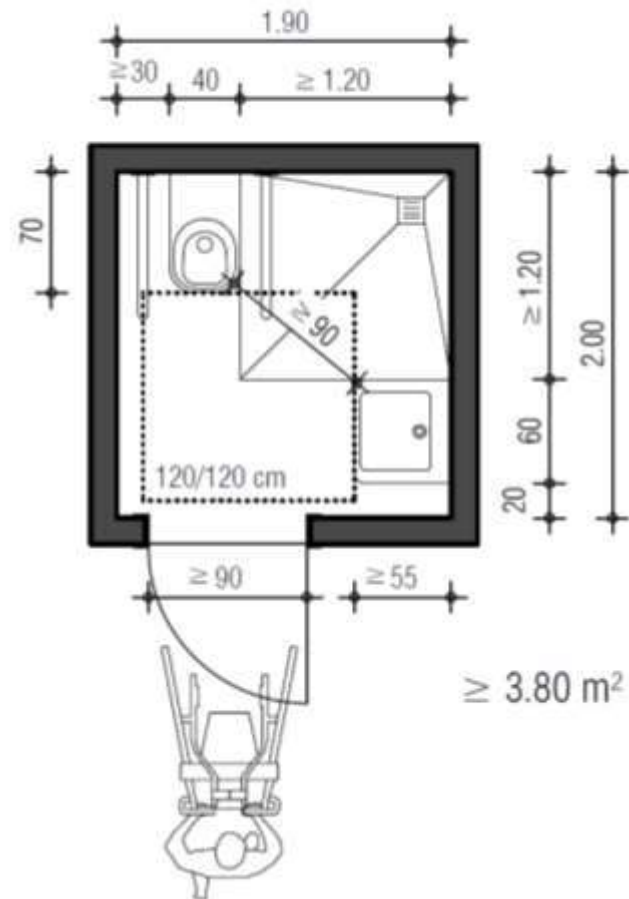
Result:

220,000 uses with 16 minutes caretime means

58,700 hours a year

33 fulltime equivalents.

barrierefrei gemäß DIN 18040-2



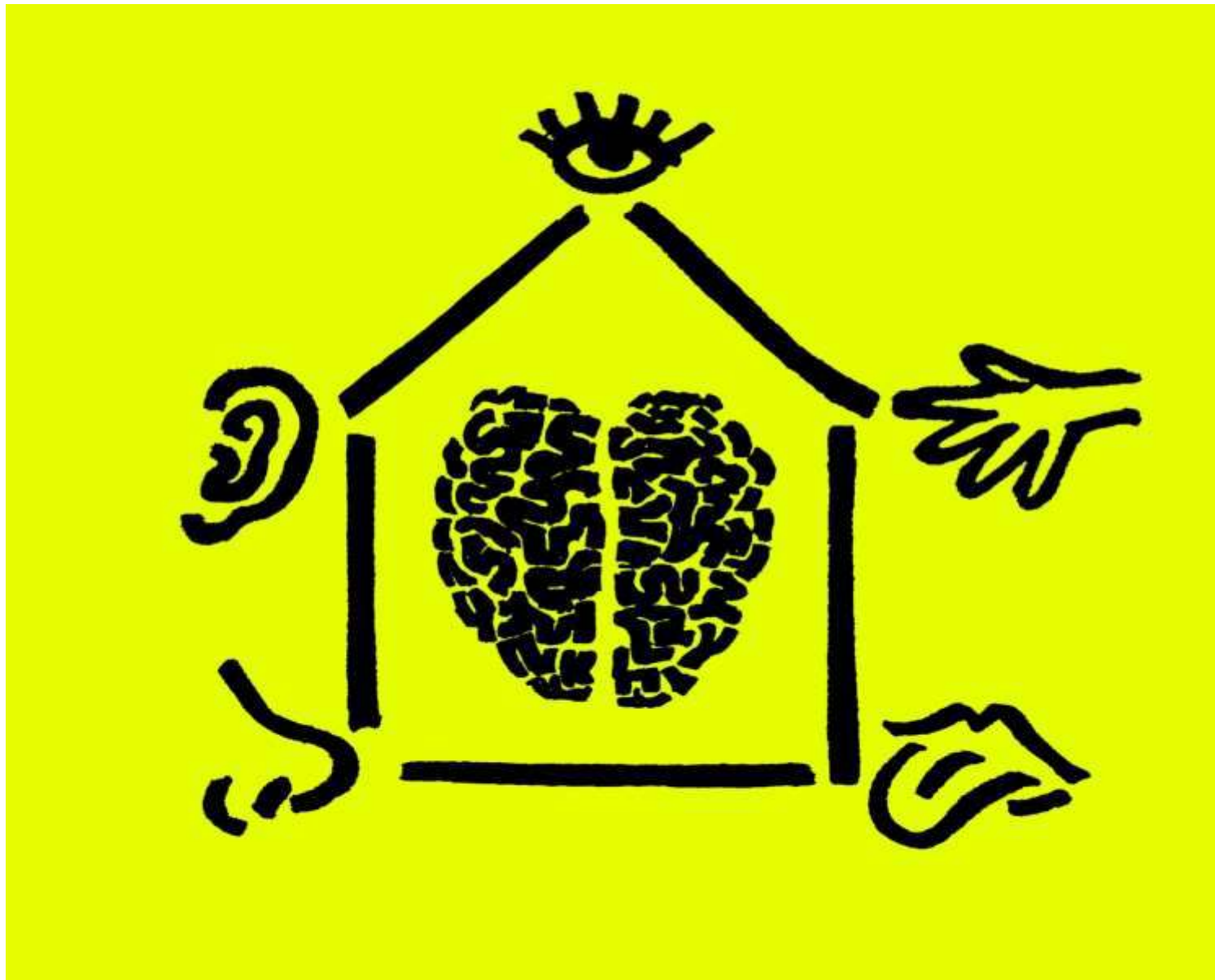
The common thread

We want to enable people to make the best use of any and all of their remaining senses to keep life in balance as long as possible!



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Thank
you !