



# Sensory Design & Healthcare

## Colour Design and Lighting

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**EPSRC**



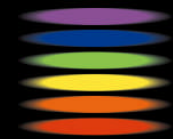
**NHS**

Department for  
**Transport**



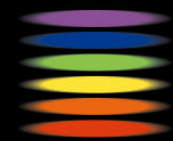
# Research in the healthcare sector

- NHS hospital audits
- Longterm healthcare sector
- Sites in France and Denmark



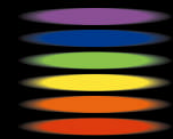
## Aims:

- Maximise the potential benefits of colour design and lighting for all
- Quantify some beneficial uses of colour design and lighting for inclusive environments
- Identify a mechanism involved in the provision of colour design and lighting for a sense of well-being
- Use science based methodology in design research for best practice



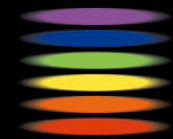
# Our Expertise:

- Colour & vision
- Environmental psychology & sensory design
- Engineering product design
- Contrast, colour & design
- Lighting
- Signage, wayfinding & orientation
- Visual impairment, BR Part M & DDA
- International research into good practice



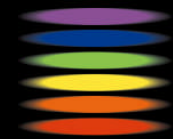
# Collaboration:

- Environmental psychologist
- Statistician
- Experimental psychologist
- Lighting designer
- Vision scientist
- Gerontologist
- Engineering product designer
- Healthcare specialists
- Architects and Interior designers



# Agenda:

- Complex territory of human interface with interiors
- What tools can be used to understand users' needs?
- Immobility or lack of freedom to move requires thoughtful design
- Lack of accessible knowledge collated on methods for tomorrows' designers on users' needs and sensory design interventions
- There is a considerable amount of misinformation
- Sensory design must explore possibilities beyond the pragmatic and engage the senses



# Healthcare environments

## Objectives:

- **To improve the visual environment of hospitals**
  - **Ambience**
  - **Confidence & safety**
  - **Accessible & inclusive**
  - **Attractive environment & visual stimulation**
  - **Stress reduction**
  - **Enhance patient recovery, staff morale & productivity**
  - **Ease of navigation and wayfinding**
  - **Compliance with Disability Discrimination Act**
- **To produce clear guidance on colour and lighting design in hospitals for NHS specifiers**

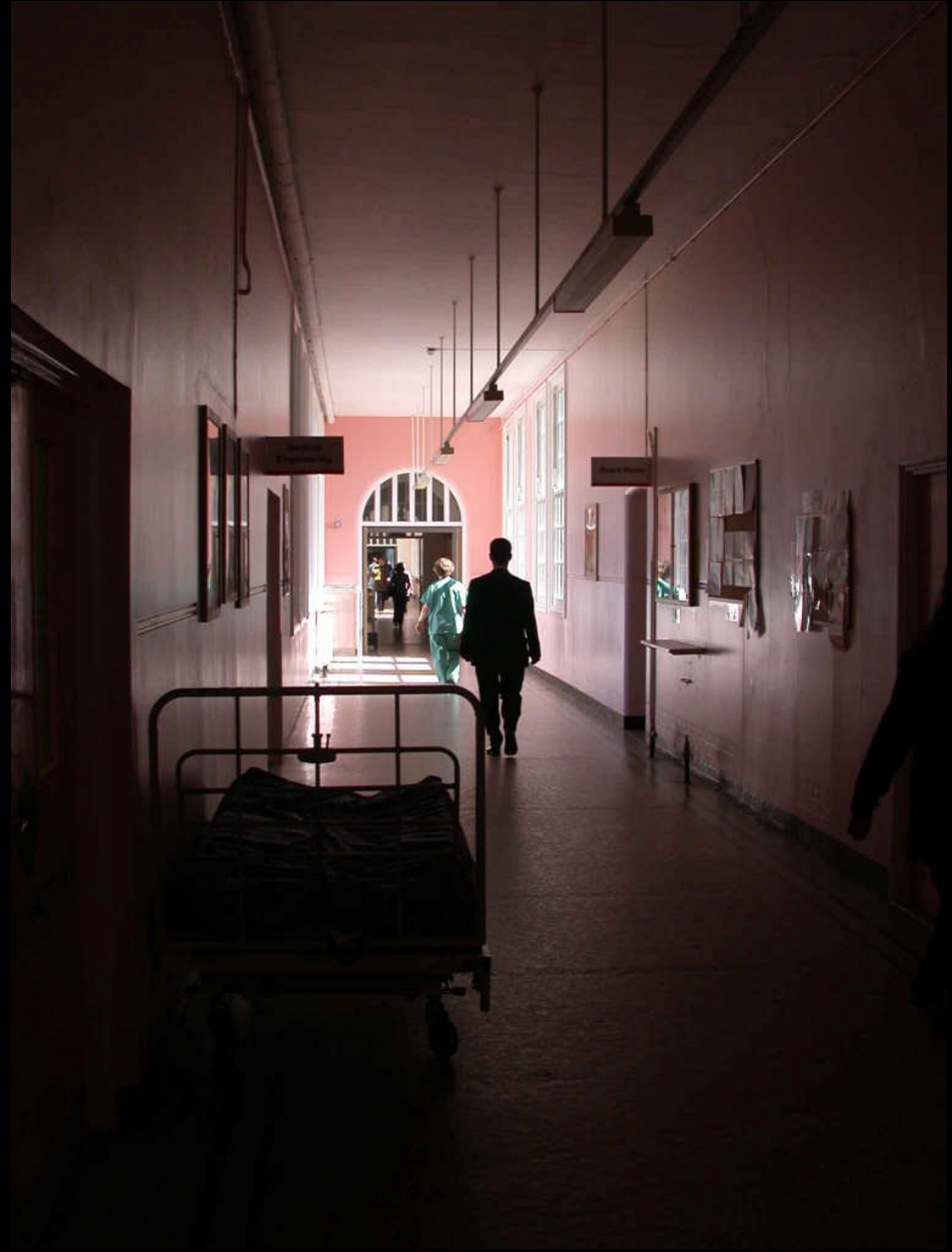
**Funding: NHS Estates – Research & Development**







Ambience



Confidence and safety



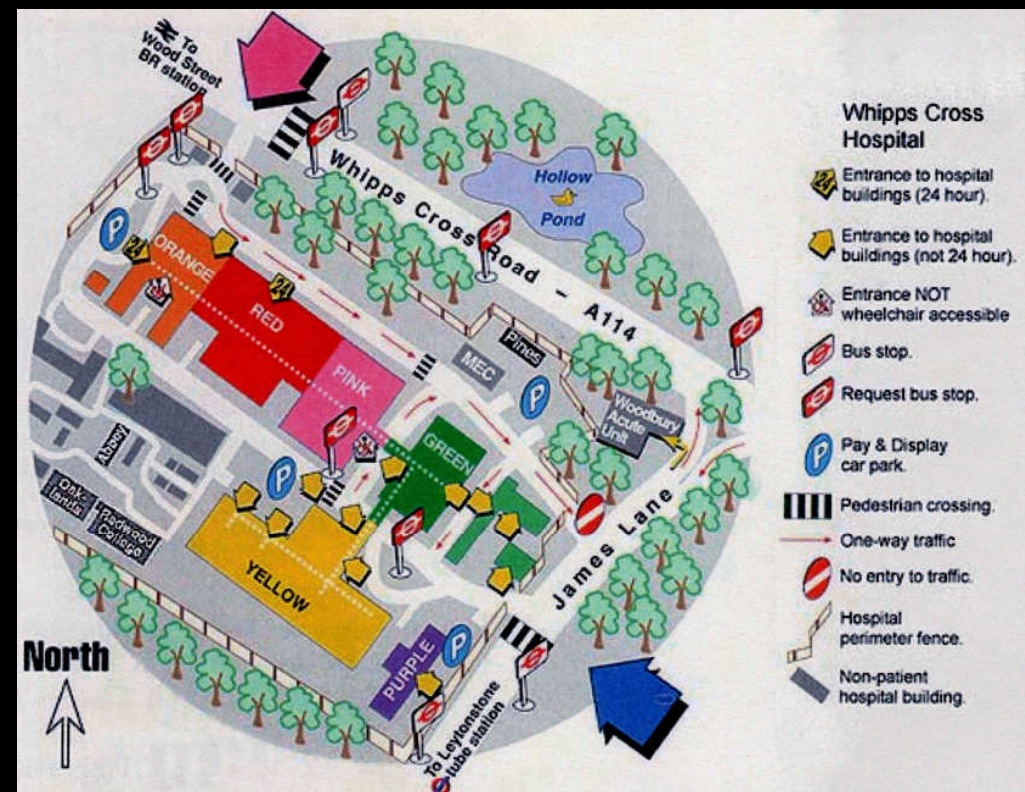
Staff morale and productivity



Visual noise



Stress reduction by guarding uncluttered spaces



Colour coding strategies can cause more confusion



Landmarks aid orientation



Lighting design







ROYAL EYE INFIRMARY



Board Governors July 1936. Major J. W. E. Bennett, Chairman (66 1/2 years)



A view of 'normal' life outside is liked by older people



Windows and a view out are essential for a sense of well-being in hospitals

Daily Mirror August 5 2004  
Daily Mail August 10 2004



...the floor where patients and visitors watch TV  
Squalor open to view: The inside

...trewn for  
...ridor amid  
...ed mop-  
...is infested  
...s.  
...rbing sight  
...ara Bendon  
...o visit her  
...in hospital.  
...eking set of  
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...mother has  
...re than two  
...infection.  
...y the same  
...sible for a  
...ards away  
...e not been  
...s.  
...ighted the  
...ws at the  
...entre last  
...for John

# MY DYING WISH IS: CLEAN THE HOSPITAL WINDOWS

Last Thursday's Daily Mail

hygiene across the NHS at a time when hospital superbugs such as MRSA are claiming up to 20,000 lives a year and infecting 700,000 patients.  
Mrs Bendon, a 53-year-old mother of two, is planning to send the photographs to Tony Blair. They were taken on Sunday, August 1, in the Old Building wing of the hospital.



ACCIDENT: Yvonne Yorath

...Girl's rage at Yorath  
...ER woman former  
...one star Terry Yorath  
...in, were with...  
...ing most yesterday he  
...uld be sent to jail.  
...Yorath, 35, pleaded  
...y this week and will  
...ntermediate prison.  
...ative Adam, 27, had  
...d broken and a broken  
...in in the accident in  
...de to him.  
...is still off work and  
...ing with crutches.  
...rvice said: "I think  
...on like him should go  
...to jail. He shouldn't be  
...ed to drive again."  
...e asked: "He has not  
...any attempt to  
...his way to apologize.  
...ld have thought that  
...the least he would  
...have done."



NO SLOT: Pam

...morgy  
...e split  
...Anderson says  
...pped rock star  
...Michael after  
...in on an orgy  
......  
...e, 37, told US  
...Howard Stern.  
...I the buffet. I  
...e a la carte. I  
...to man."  
...Raywatch babe  
...the detector  
...he radio about  
...in, quipped her  
...sex life.  
...indicated she  
...with a woman.  
...instead: "I  
...I missed a girl  
...around."  
...she had re-  
...with ex-boy-  
...to said: "I was

# This is my dying gift: £1,500 to give the hospital's windows first clean in 7 years



GLOOMY: Hospital where Dr Hughes-Games was treated and, inset, a grubby window

## PATIENT SHOCKED BY GLOOM



AN NHS hospital is to have its windows cleaned for the first time in SEVEN years...after a dying patient left money for the work to be done.  
Leukaemia victim Dr John Hughes-Games, 77, was appalled that he could barely see outside because of the dirt.  
The last wish was to donate £1,500 to have all 300 windows cleaned at the Bristol Oncology Centre. He was 80 when he died. He received palliative treatment at the hospital but the windows made everything gloomy.  
"Every day would look dull even when it wasn't."  
"He just wanted people inside the building to be connected to the outside world."  
"It's an unusual gesture but the kind of thing to do. It will be a good memorial. He wanted people to see the sun." Dr  
Hughes-Games, a GP for 40 years, was told his illness was terminal in February. He spent three weeks in the hospital, before dying at his home in Clifton, Bristol, last month.  
Mourners at his funeral also contributed to the cost of cleaning the windows.  
"Firms are now tendering bids for the work and one company said: 'It's a big job - they are in a terrible mess.'"  
Dorset's Bristol Healthcare Trust yesterday admitted it has no budget for cleaning windows.  
A spokesman said: "The Trust has several large old buildings which require special safety equipment for window cleaners."  
"Because of this, regular window cleaning costs have become prohibitively expensive."  
"It has been a sad situation. Health Secretary Paul Burstow called the situation 'chammy'. He said: 'Keeping the windows clean should be part of basic maintenance of the hospital.'"  
richard.mills@gemvive.co.uk

# 70%

of the UK population die in hospital.....

Ref: Jane Priestman

# Colour Schemes for Long-term Healthcare Environments

## Objective:

- To identify critical issues related to design and colour of interiors within long-term healthcare environments – 6 weeks or more
- Determine particular areas where colour and design can alleviate problems of confined spaces for residents and patients



Arts & Humanities  
Research Council

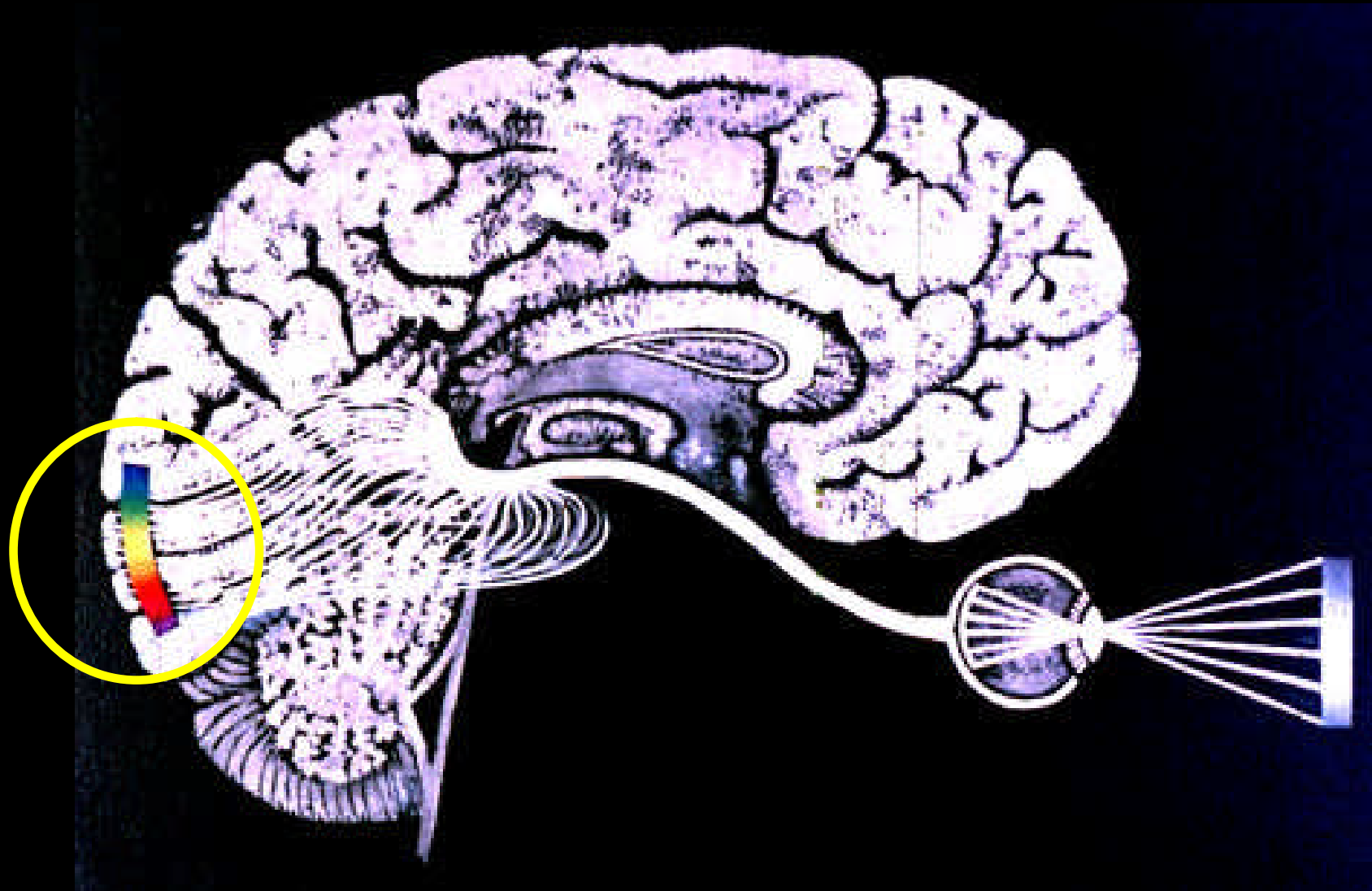
**Funding: Arts and Humanities Research Council**  
**Research Fellow: Dr Mark Matheson**



# Under/Over stimulation effects of colour

- Reduction of visual stimulation leads to visual hallucinations (Sommer, 1969).
- A University of Vienna study showed room colour influenced concentration span of office employees
- White cells caused violent reactions in certain prisons (Fairweather and McConville 2000)

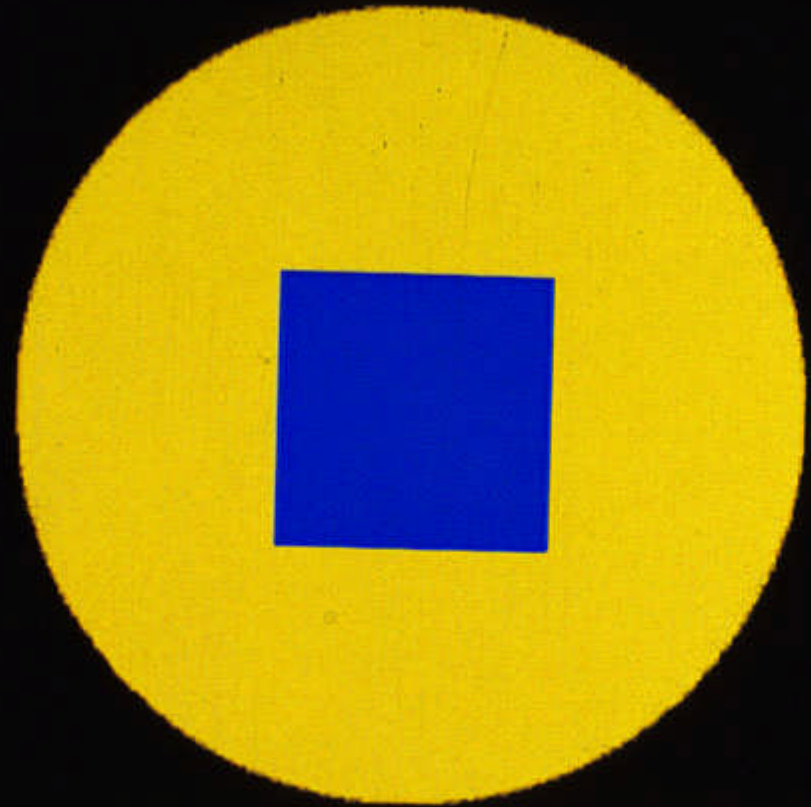


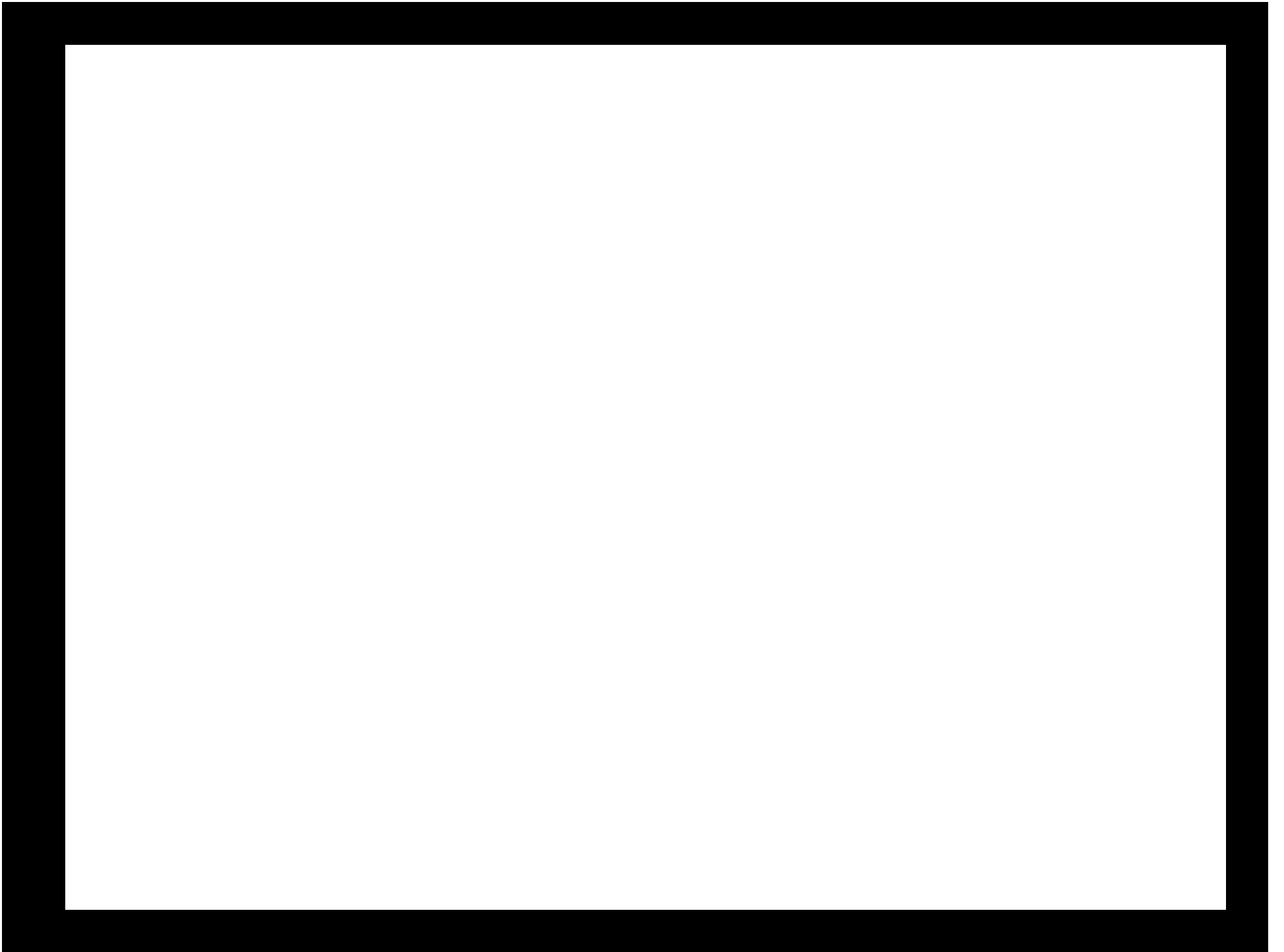


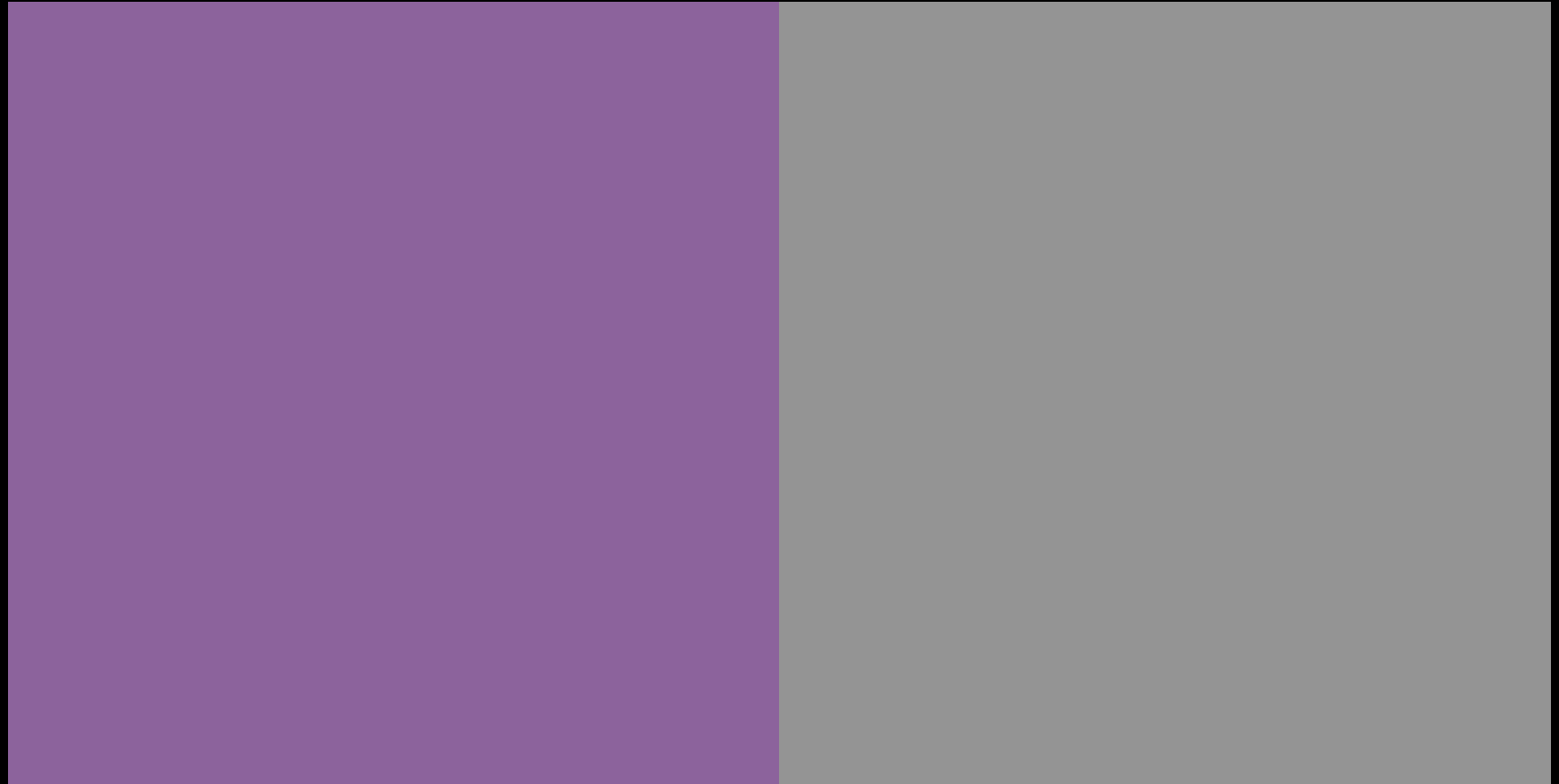
Eye and Brain: Portal and Processor

# Contiguous spaces

- Residents often have access to only three contiguous spaces
- Less mobility requires more variety in surroundings.
- Light levels in contiguous spaces should be carefully managed
- The eye requires longer to adapt as the visual system ages
- Adaptation becomes slower between light and dark spaces.
- Colours can give rise to complementary after-image.







Older people with a yellowing lens will see the square on the left as grey as the grey on the right. (Dalke, Stott 2005)

# Colour design and dementia

- Colour can be used to promote desired behaviour, discourage undesired behaviour and enhance the ambience of the environment (Cooper, Mohide and Gilbert, 1989).
- In one study dementia patients were more interested in food if served off different coloured plates - this stimulated their appetites.
-

# Site Audits



## The Building

- Located in suburban West London
- Set within picturesque walled and wooded grounds on the edge of a large park
- Front façade faces south east
- Each resident has a private room; a couple of doubles
- 6 common rooms: dining room, 4 day rooms, conservatory
- Social events and religious observances take place





Sheltered Housing



## Entrance

- The main entrance is attractive with easy access
- Newly refurbished



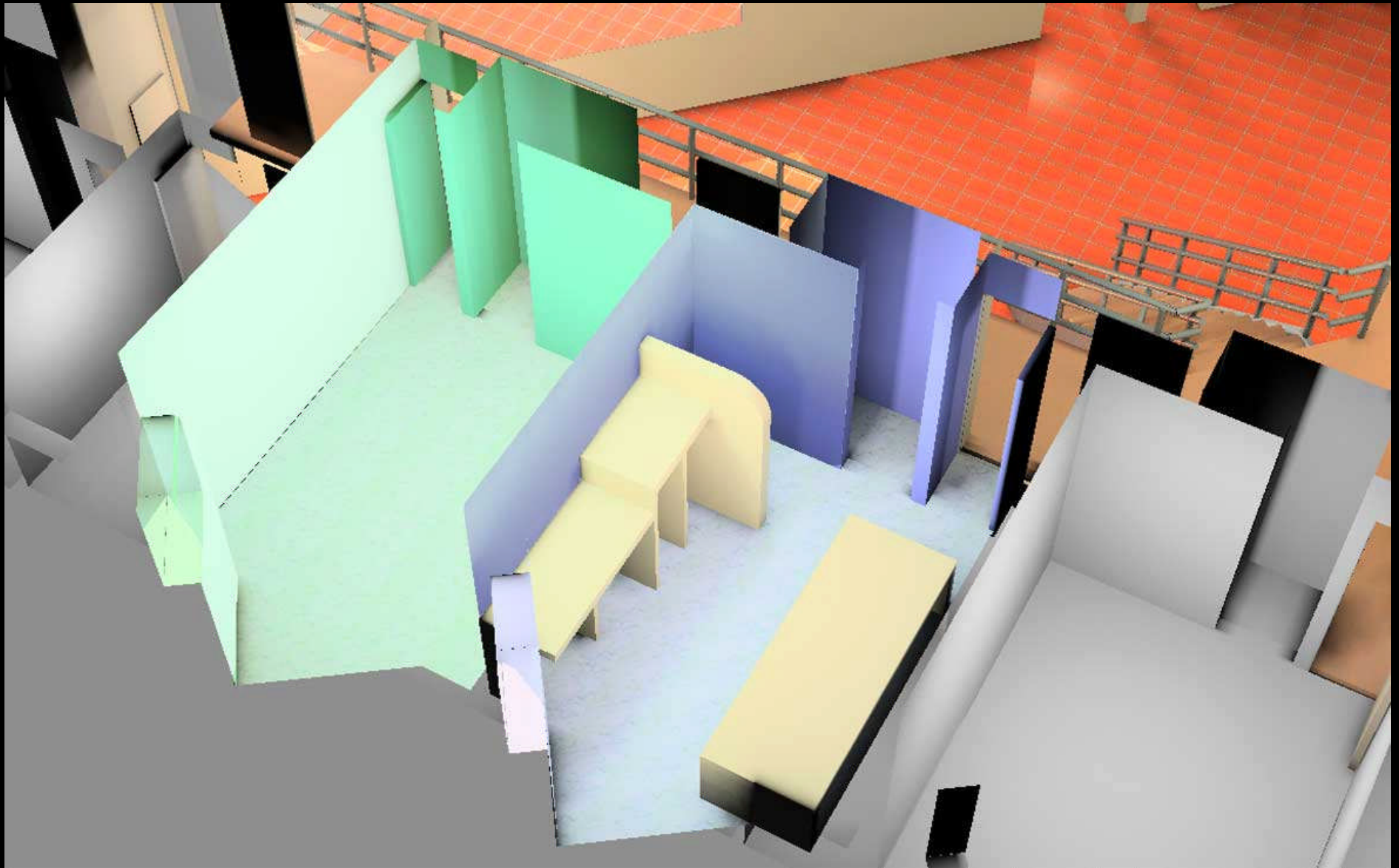
Dining room



**Colour vocabulary which produces a 'sameness'**



**'Blue Room' and one blue bedroom most commented on**



**Blue v green cell interiors and association areas**

## Residents' Room



- Appearance of personal interior was homely
- Good provision of plants, flowers and art
- Opportunities for assistance with personalisation

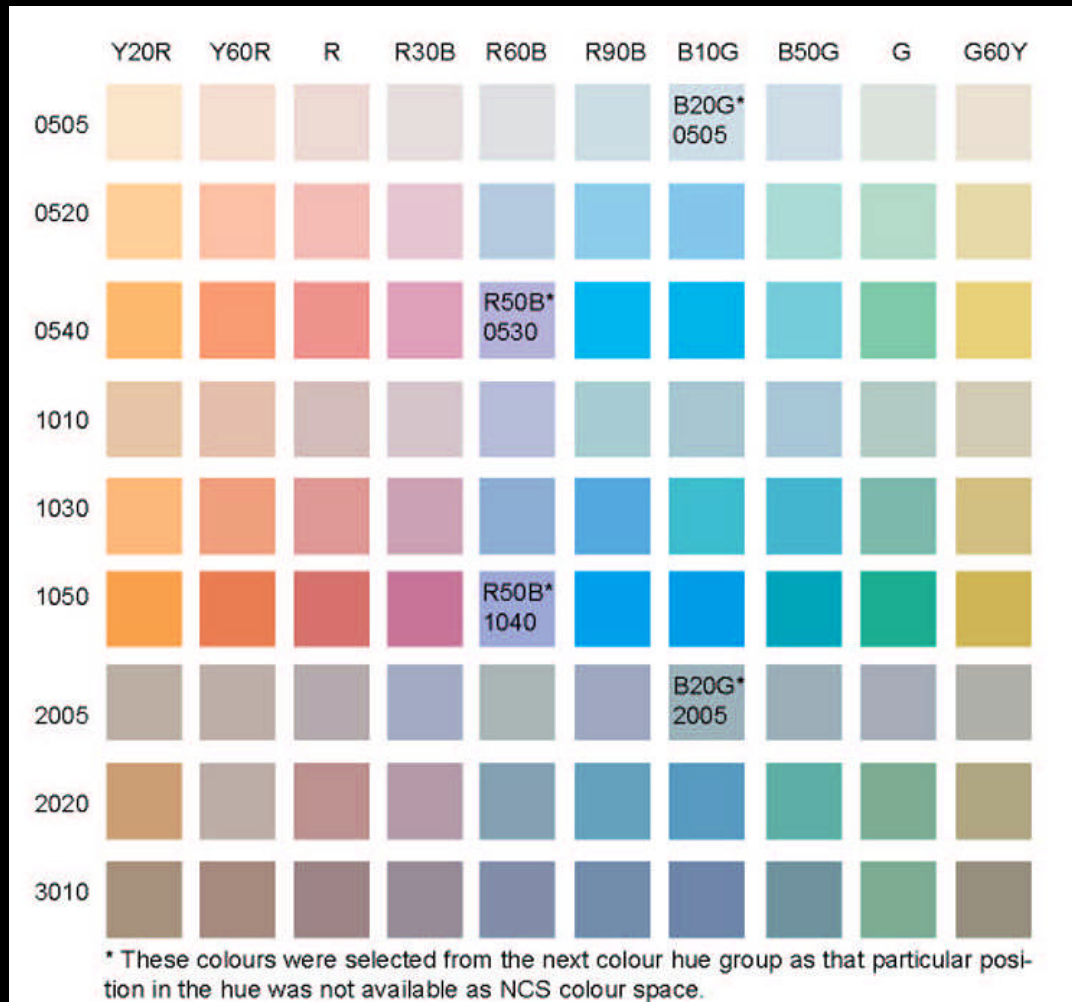




# **Evaluation of colour schemes**

# Number of participants: 112

Age:	20-29	30-39	40-49	50-59	60-69	70-79	80 and over	Total:
Female:	8	8	8	8	8	8	8	56
Male:	8	8	8	8	8	8	8	56
Total:	16	16	16	16	16	16	16	112



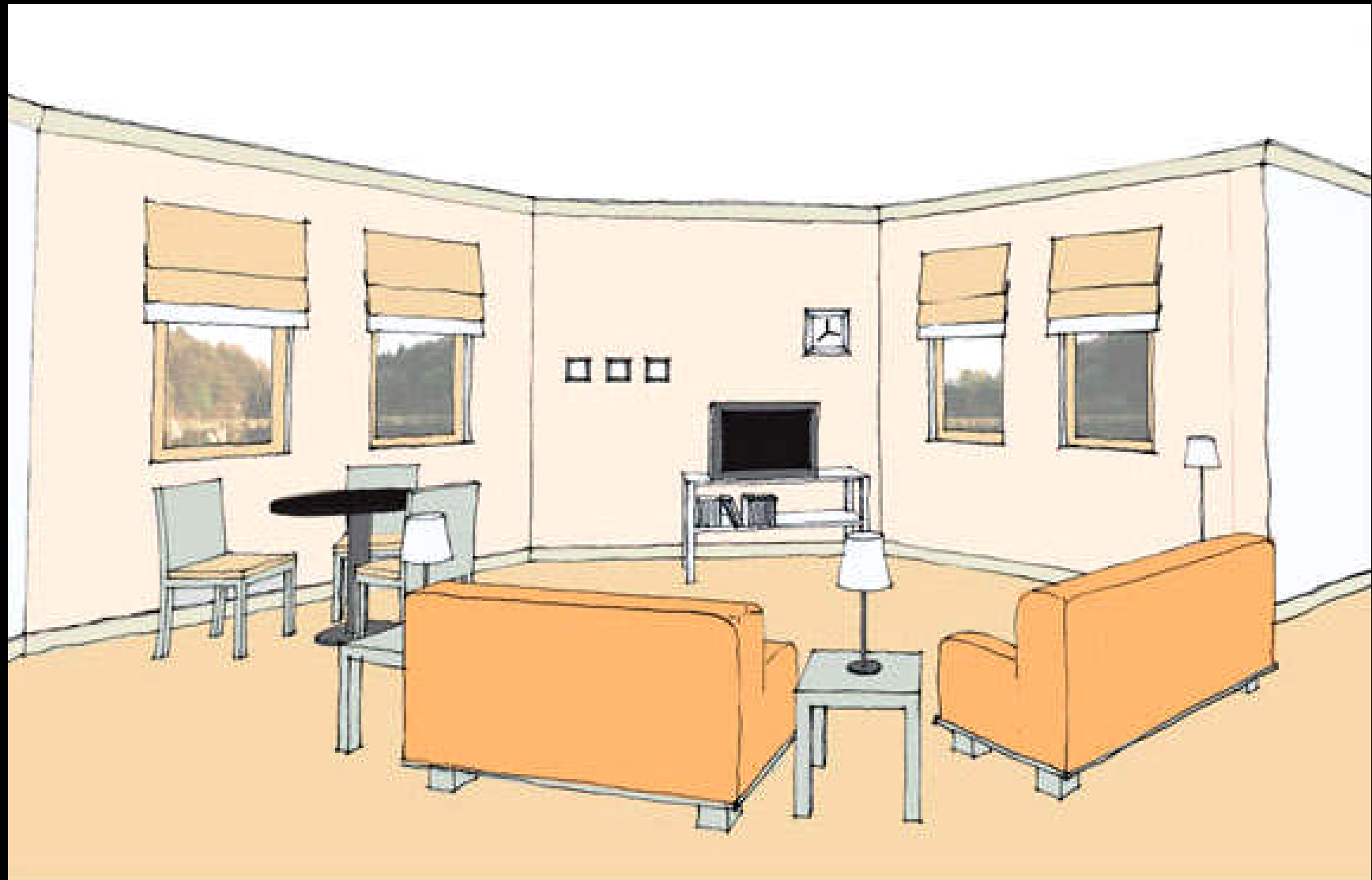
- NCS**
- 10 Hues
  - 9 Shades



**Bedroom 1**



**Corridor 1**



**Day room 1**



Participant selecting preferred colour schemes for a 'Journey' from Bedroom, Corridor to a Dayroom.

# Bedrooms: Top colours

1<sup>st</sup> (19)



0520 R90B

2<sup>nd</sup> (18)



0505 R30B

3<sup>rd</sup> (12)



0505 Y60R

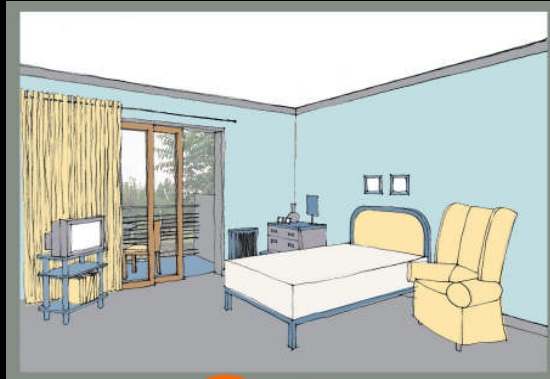
3<sup>rd</sup> (12)



0505 R50B

# Bedrooms: Top colours

1<sup>st</sup> (19)



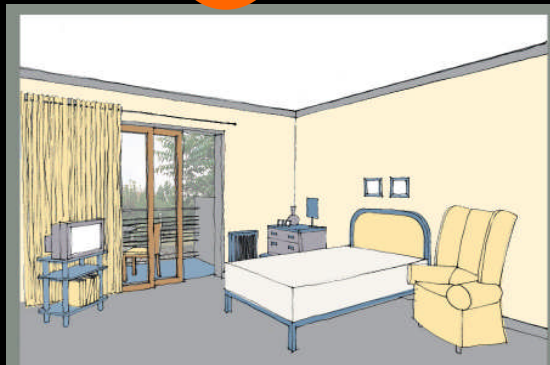
2<sup>nd</sup> (18)



0520 R90B

0505 R30B

3<sup>rd</sup> (12)



3<sup>rd</sup> (12)



0505 Y60R

0505 R50B



3rd (12)



0520 R50B

3rd (12)

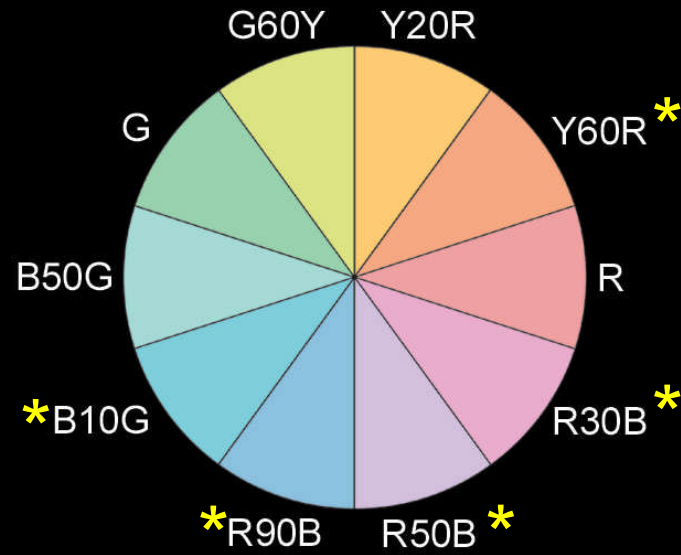


0505 B10G

3rd (12)



0505 R90B



# Corridors: Top colours

1<sup>st</sup> (22)



0505 R30B

2<sup>nd</sup> (21)

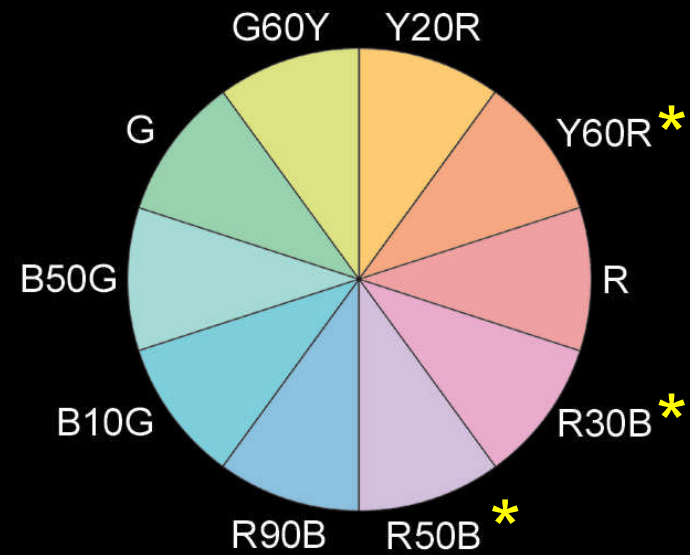


0505 Y60R

3<sup>rd</sup> (19)



0505 R50B



# Dayrooms: Top colours

1<sup>st</sup> (14)



0505 Y20R

2<sup>nd</sup> (13)



0505 R90B

3<sup>rd</sup> (12)



0505 Y60R

3<sup>rd</sup> (12)

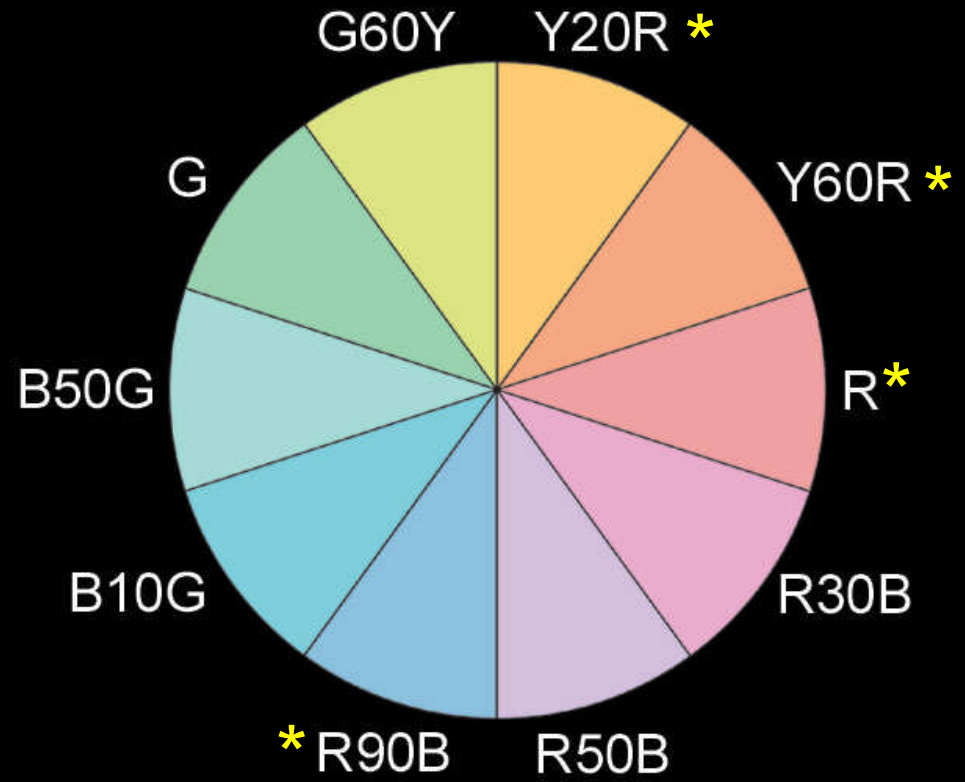


0505 R

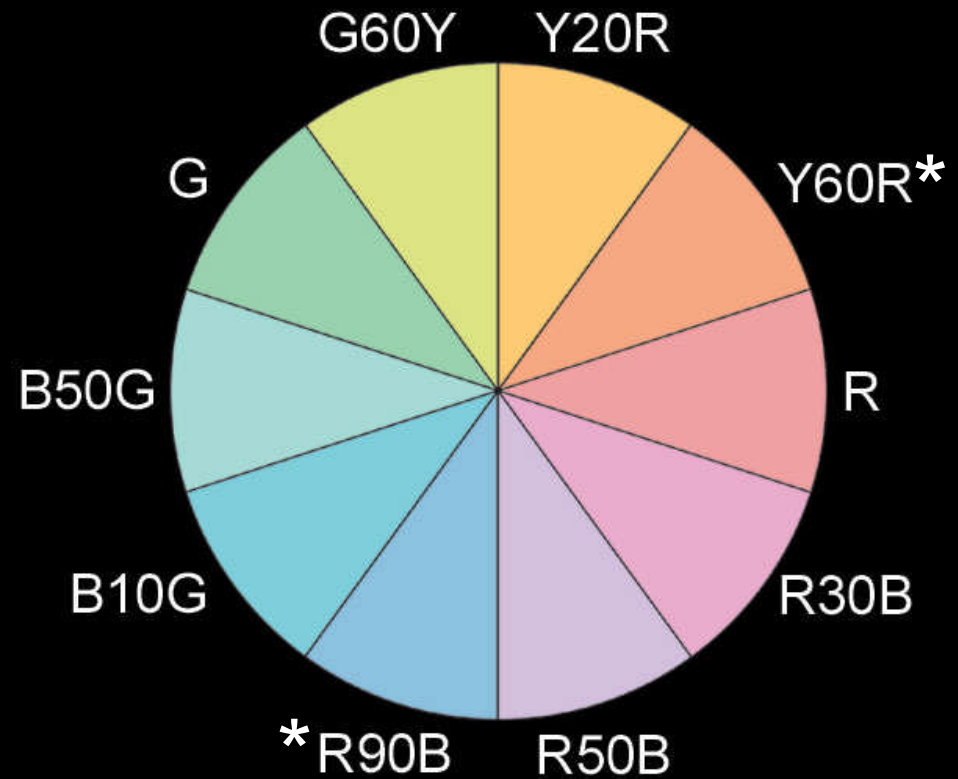
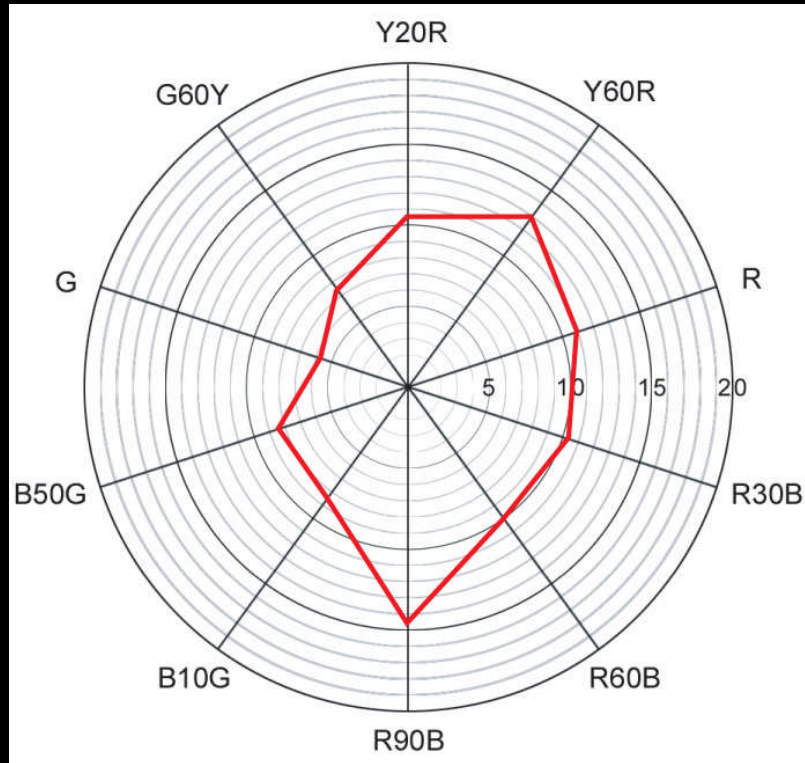
3<sup>rd</sup> (12)



0520 R



# Overall Hue Preferences



NCS System

**‘Real-World’ evaluation**

**Mental Healthcare  
North East Yorkshire**



**Recreation Hall**









After: Refurbishment under way with ceiling removed



**What do you like about the Hall?**

The brightness of the hall with a calming feeling.

The colour scheme.

The reading area + courtyard areas.

The courtyard is great love, the little painted window of the landscape all the art looks really good.

Delightful!

Much more welcoming & relaxing (like the little area which is cornered of where the water feature is nearby).

Much better colouring +  
Much better lights

WELL DONE.

Good what you do for the people.

NICE

A LOT MORE CHEERFUL to what it used to be.  
NICE OUTSIDE AREAS

GOOD

Everything

New doors and windows which look like have always been here

# Sites in France and Denmark

Home for Dementia Patients

Brittany















































Herlev Hospital  
Copenhagen











←  Toilet



























**1970's!**

Poul Gernes



Lewisham Youth & Children's Community Health Centre



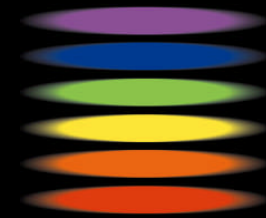






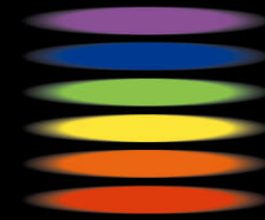
Colour and lighting can be a powerful tool in sensory design if the building's user is understood

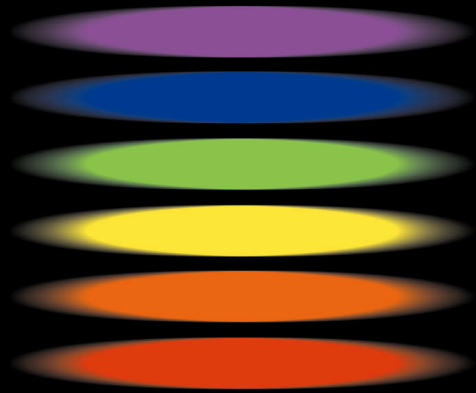
**Thank you**



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Tony Weekes - Home Office, Prison Service  
EPSRC, DfT, AHRC, DULUX





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