



# Sun shade structures from BBC Plymouth (Andrew Brown)

August 2006

# Ultraviolet Protection Factor (UPF): background

# UPF definition



UPF (Ultraviolet Protection Factor) - how much the effect of solar UVR is reduced when passing through *fabric* of clothing



$$UPF = \frac{\sum_{\lambda=290}^{\lambda=400} E(\lambda) \varepsilon(\lambda) \Delta\lambda}{\sum_{\lambda=290}^{\lambda=400} E(\lambda) T(\lambda) \varepsilon(\lambda) \Delta\lambda}$$

$E(\lambda)$  - spectral irradiance of terrestrial sunlight

$\varepsilon(\lambda)$  - erythema action spectrum

$T(\lambda)$  - spectral transmittance

# UPF: important to know



- Not simply a transmittance of fabric: takes into account that different wavelengths of UVR spectrum have different effects on human skin
- *Defined for fabrics, not garments*
- Similar to SPF for sunscreens
- Measured in 290 - 400 nm spectral range: naked eye doesn't see it
- UVA - UVR between 315 nm and 400 nm
- UVB - UVR between 280 nm and 315 nm
- UPF (and SPF) is, mainly, characteristic of UVB protection of material but UVA also has adverse health effect
- UPF15 recommended by Cancer Research UK as a minimum protection level
- Fabrics are tested according to British Standard BS EN 13758-1: 2002 "Textiles – Solar UV protective properties"

Good UVR protection: high UPF (>15) AND low UVA transmittance  
Fabric should cover skin

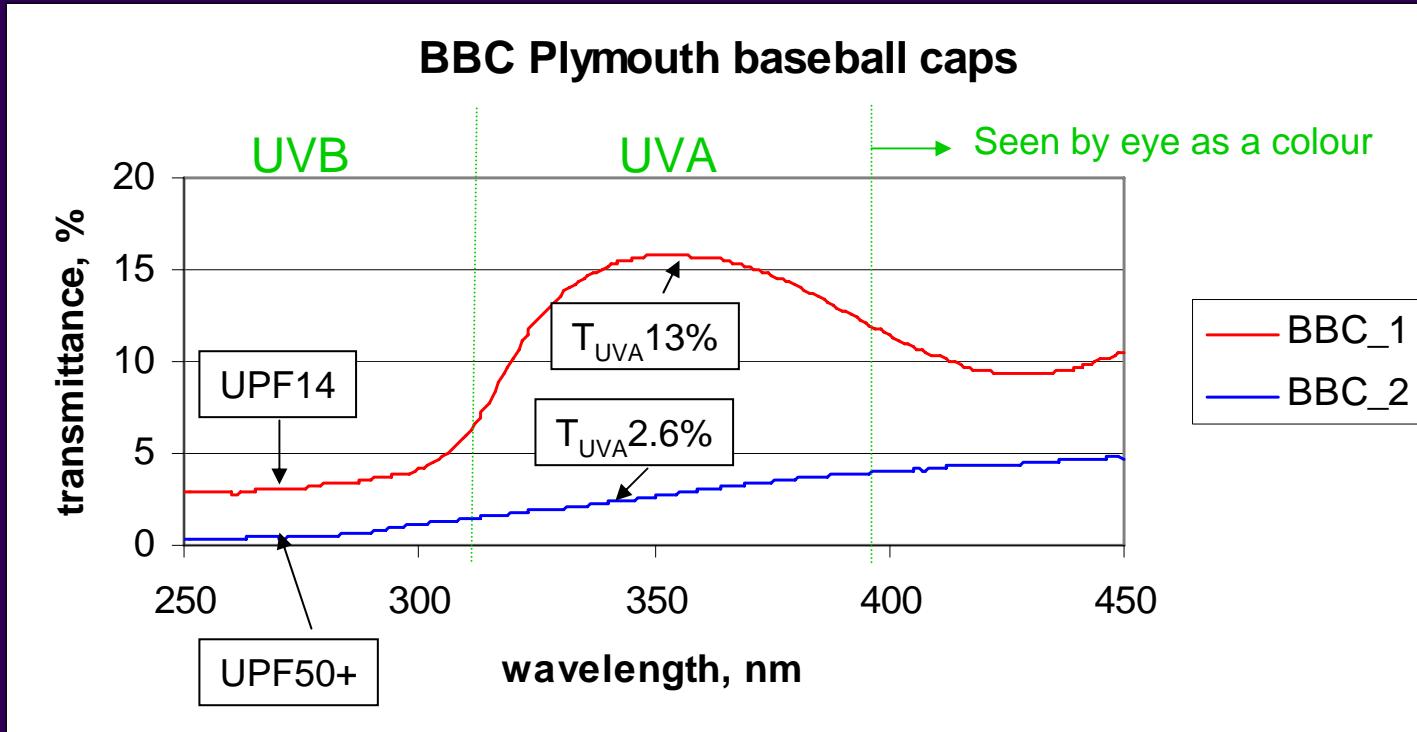
# UPF test results

# Tested samples



Sample No	Description	Retailer	Price	Fabric UPF	T <sub>UVA</sub> av, %
BBC_1	Yellow baseball cap	Mothercare	£6.00 (sale £3.00)	14	13.0
BBC_2	Grey Urban Beach baseball cap	Osprey	£3.99	65	2.6
BBC_3	White Compact parasol	Mothercare		16	8.5
BBC_4	Pink with black trim Sun Parasol	Baby Club	£9.99	15	14.5
BBC_5	Fucshia Beach/Garden Umbrella with adjustable tilting canopy	RJM	£4.99	12	23.8
BBC_6	Monodome Beach Shelter with zip door	Tricky Dickys	£6.99	purple 12; red 12	purple 17.2; red 18.5
BBC_7	Beach Shelter with zip-up door		£6.99	Blue 17; red 15	Blue 13.0; red 14.6
BBC_8	Beach shelter	Shirley Cottage Gifts	£6.99	Blue 8; red 7	Blue 23.8; red 22.4
BBC_9	Blue and yeallow beach shelter			Blue 30; yellow 14	Blue 10.0; yellow 16.1
BBC_10	Black Pushchair parasol	Clair de lune		23	6.9
BBC_11	Navy Ladybird pram parasol	Woolworths	£8.00	11	10.9

# Results: baseball caps



# Results: parasols



Sample No	Description	Fabric UPF	T <sub>UVA</sub> av, %
BBC_3	White Compact	16	8.5
BBC_4	Pink with black trim	15	14.5
BBC_5	Fucshia Beach/Garden Umbrella	12	23.8
BBC_10	Black Pushchair parasol	23	6.9
BBC_11	Navy Ladybird pram parasol	12	10.9

High UVA transmittance

# Results: parasols (2)

Sample No	Description	Fabric UPF	T <sub>UVA</sub> av, %
BBC_3	White Compact	16	8.5
BBC_4	Pink with black trim	15	14.5
BBC_5	Fucshia Beach/Garden Umbrella	12	23.8
BBC_10	Black Pushchair parasol	23	6.9
BBC_11	Navy Ladybird pram parasol	12	10.9

- Colours are very different - UPFs are the same
- White parasol has lower UVA transmittance than pink
- Colour of fabric is often NOT an indicator of its UVR protection

# Results: parasols (3)

Sample No	Description	Fabric UPF	T <sub>UVA</sub> av, %
BBC_3	White Compact	16	8.5
BBC_4	Pink with black trim	15	14.5
BBC_5	Fucshia Beach/Garden Umbrella	12	23.8
BBC_10	Black Pushchair parasol	23	6.9
BBC_11	Navy Ladybird pram parasol	12	10.9

- Colour of fabric is often not an indicator of its UVR protection
- This white fabric provides better UVR protection than navy one

# Results: parasols (4)

Sample No	Description	Fabric UPF	T <sub>UVA</sub> av, %
BBC_3	White Compact	16	8.5
BBC_4	Pink with black trim	15	14.5
BBC_5	Fucshia Beach/Garden Umbrella	12	23.8
BBC_10	Black Pushchair parasol	23	6.9
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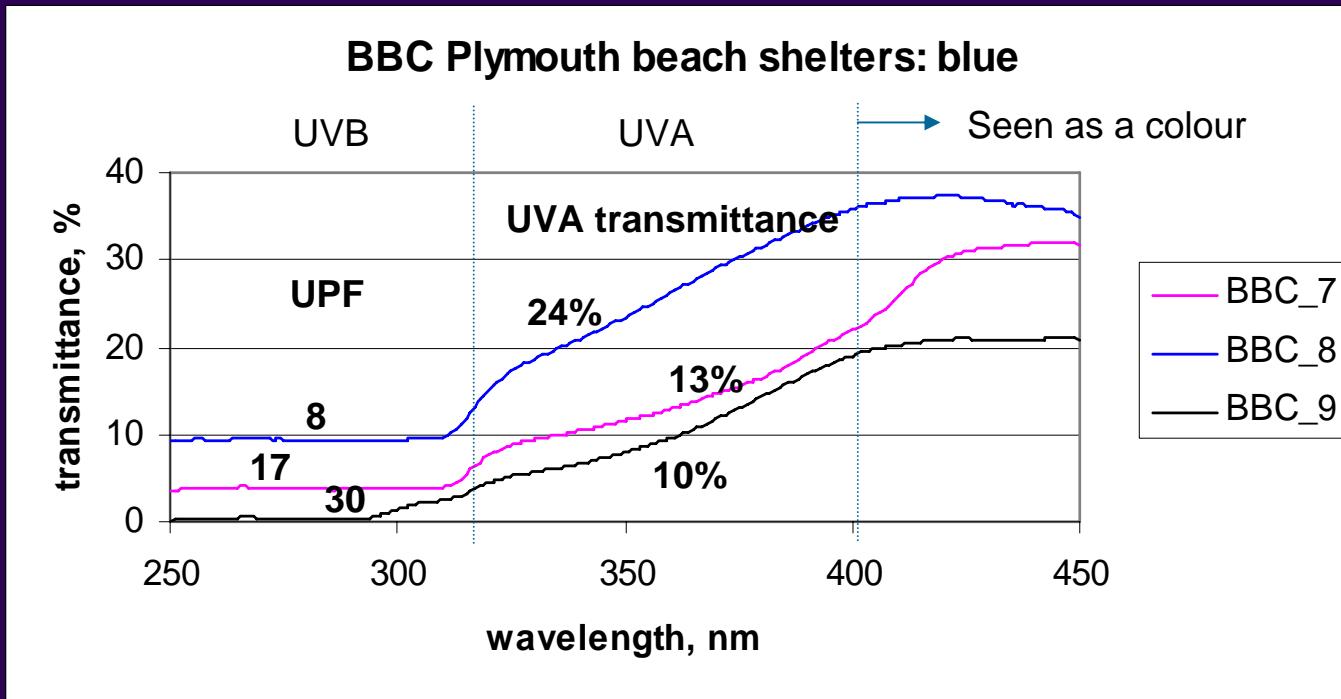
Same UPF, very different UVA transmittance

# Results: beach shelters



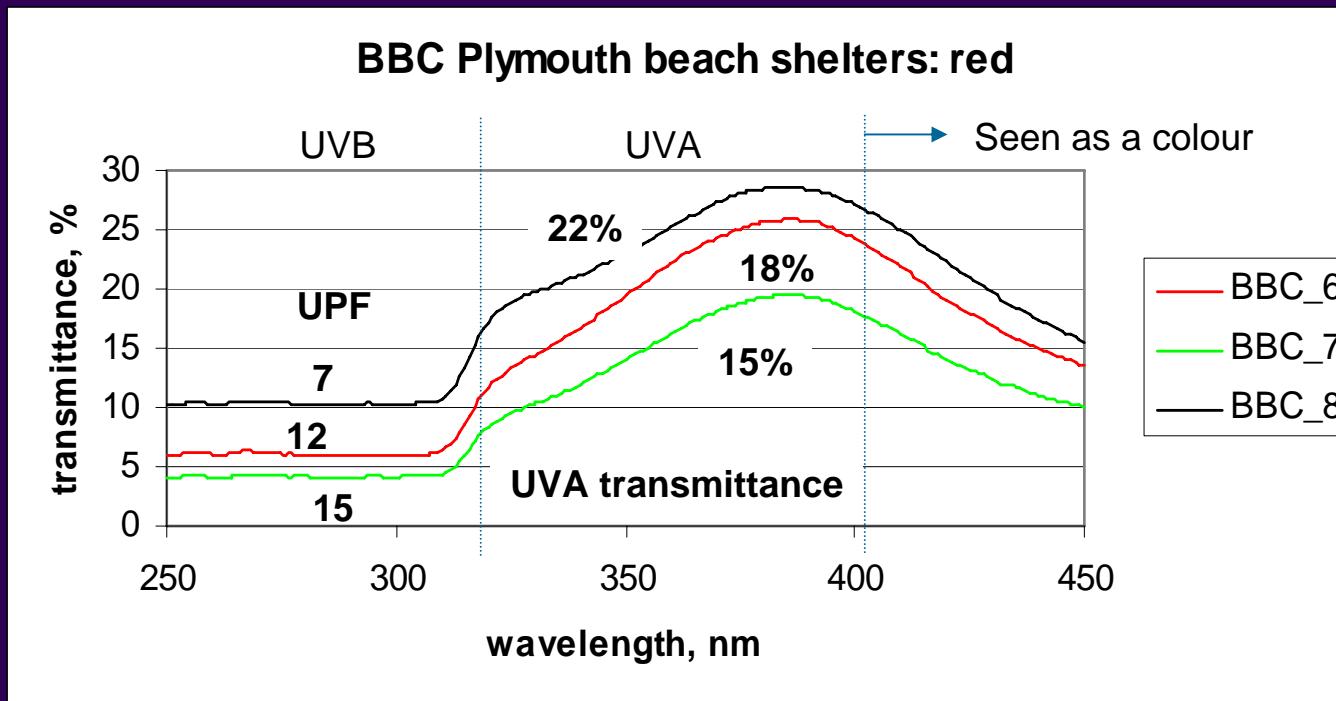
Sample No	Description	Retailer	Price	Fabric UPF	T <sub>UVA</sub> av, %
BBC_6	Monodome Beach Shelter with zip door	Tricky Dickys	£6.99	purple 12; red 12	purple 17.2; red 18.5
BBC_7	Beach Shelter with zip-up door		£6.99	Blue 17; red 15	Blue 13.0; red 14.6
BBC_8	Beach shelter	Shirley Cottage Gifts	£6.99	Blue 8; red 7	Blue 23.8; red 22.4
BBC_9	Blue and yellow beach shelter			Blue 30; yellow 14	Blue 10.0; yellow 16.1

## Results: beach shelters (2)



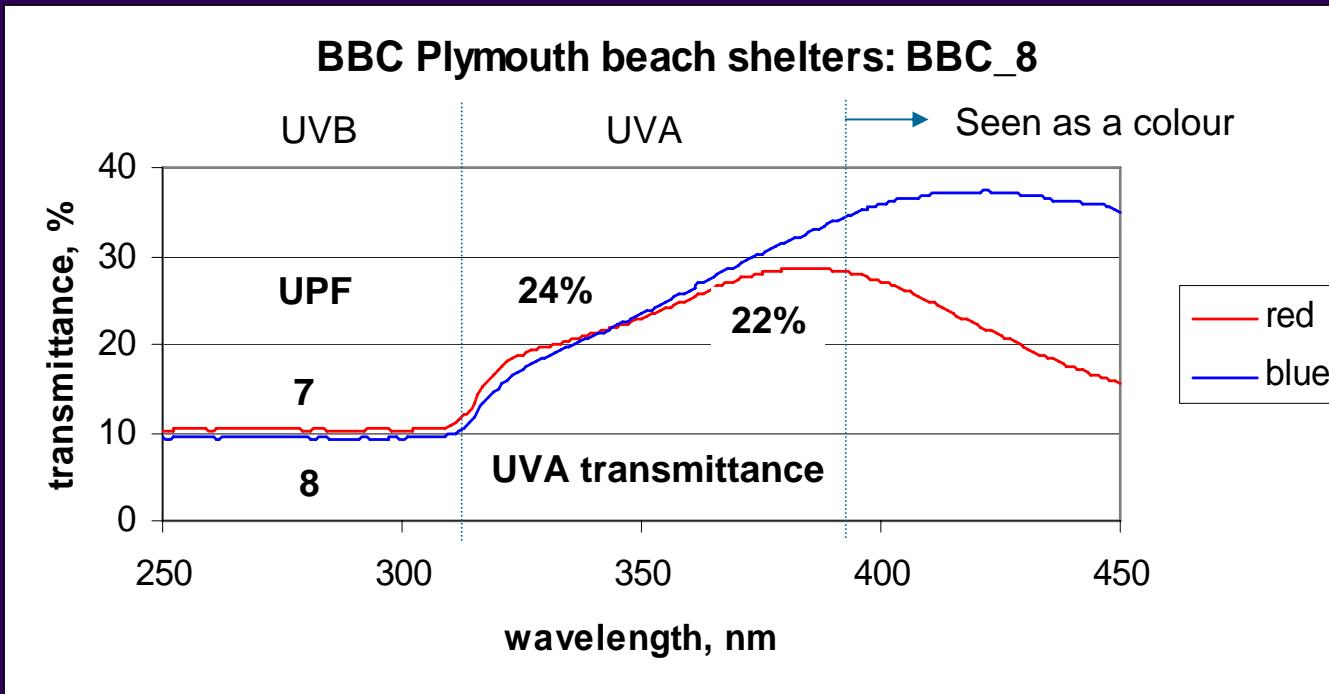
Same colour and similar fabric: UVR characteristics are different

# Results: beach shelters (3)



Same colour and similar fabric: UVR characteristics are different

# Results: beach shelters (4)



Different colours: almost identical UVR characteristics

# BUT....

- UPF is a characteristic of UVR protection of the fabric, not a garment
- Good indication of the protection level but not of the real protection
- Fabric should shield the skin: if it doesn't cover skin, it doesn't protect it

# Things to remember



- Good sun protection: fabric with good UVR protection characteristics should shield the skin
- If fabric doesn't shield the skin, even the best material does not provide sun protection

# Things to remember



It doesn't work at all

The same parasol,  
the same pushchair,  
the same direction of  
the sun light

If used incorrectly,  
might give false  
perception that your  
child is safe in the sun



# Things to remember



It doesn't work at all

The same beach shelter, the same baby: think about it when you set your shelter on a beach

If used incorrectly, might give false perception that your child is safe in the sun