



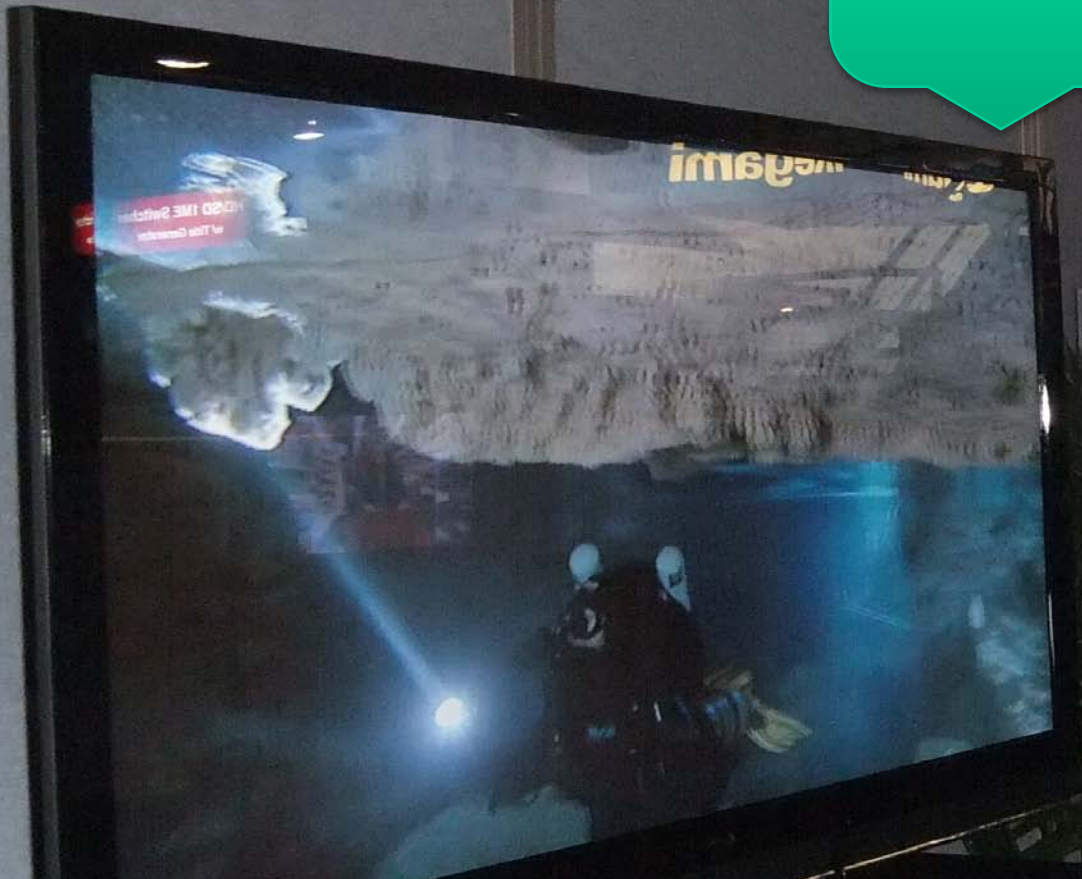
An introduction to S3D-HDTV Fairground or Art-form?

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65" 3D MONITOR
(Passive Technology)

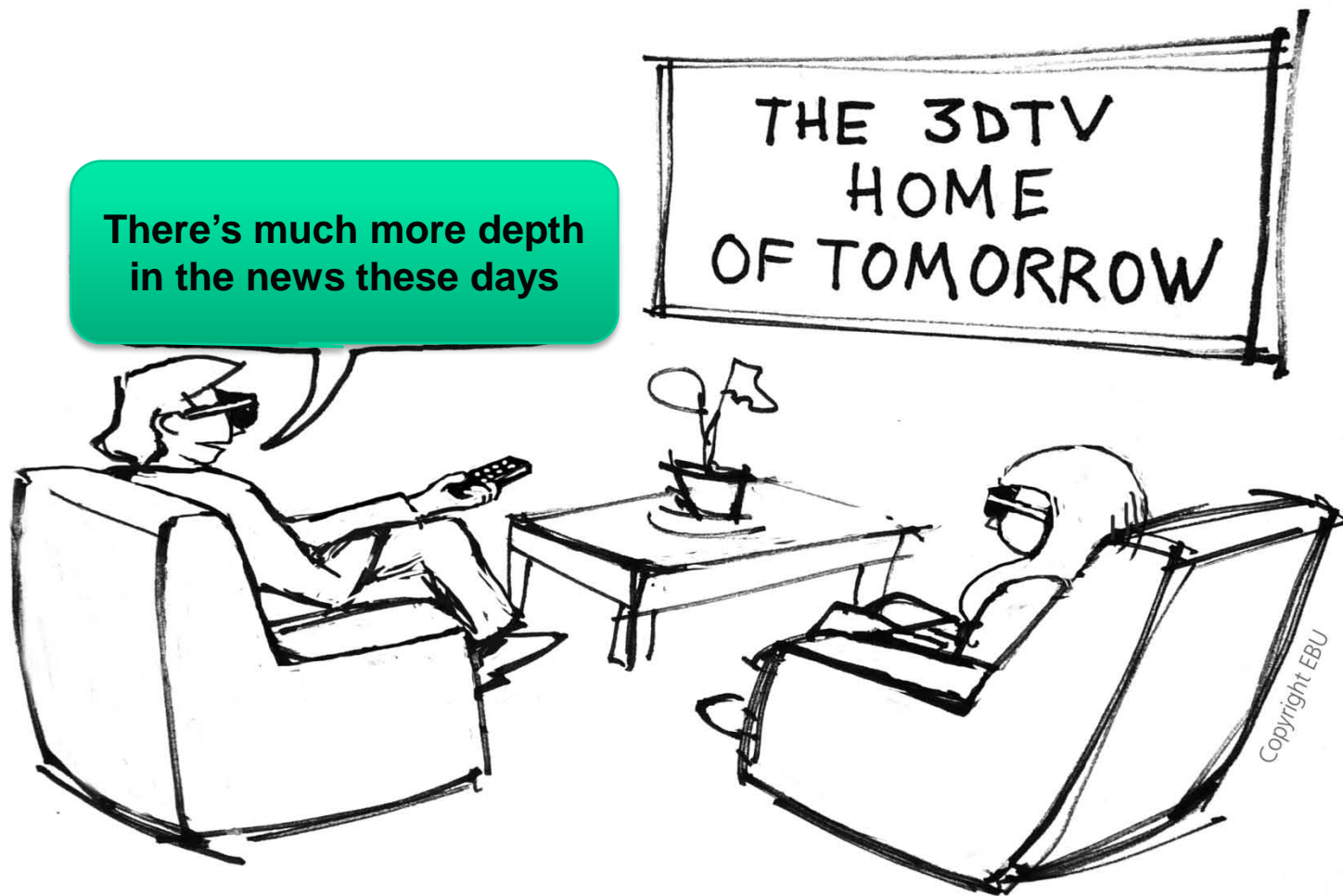
3D displays
everywhere now!



**Production
equipment is
available too**



There's much more depth
in the news these days



Everyone can watch 3DTV now



There are a few 3DTV broadcasters today

BSkyB (UK)

Sky Deutschland (Germany)

Orange (France)

ESPN (US)

DirecTV (US)

Japan

Korea trials

**BBC (UK) trial from Wimbledon
and plans for Olympic Games**

ZDF trial (Die Huberbaum)



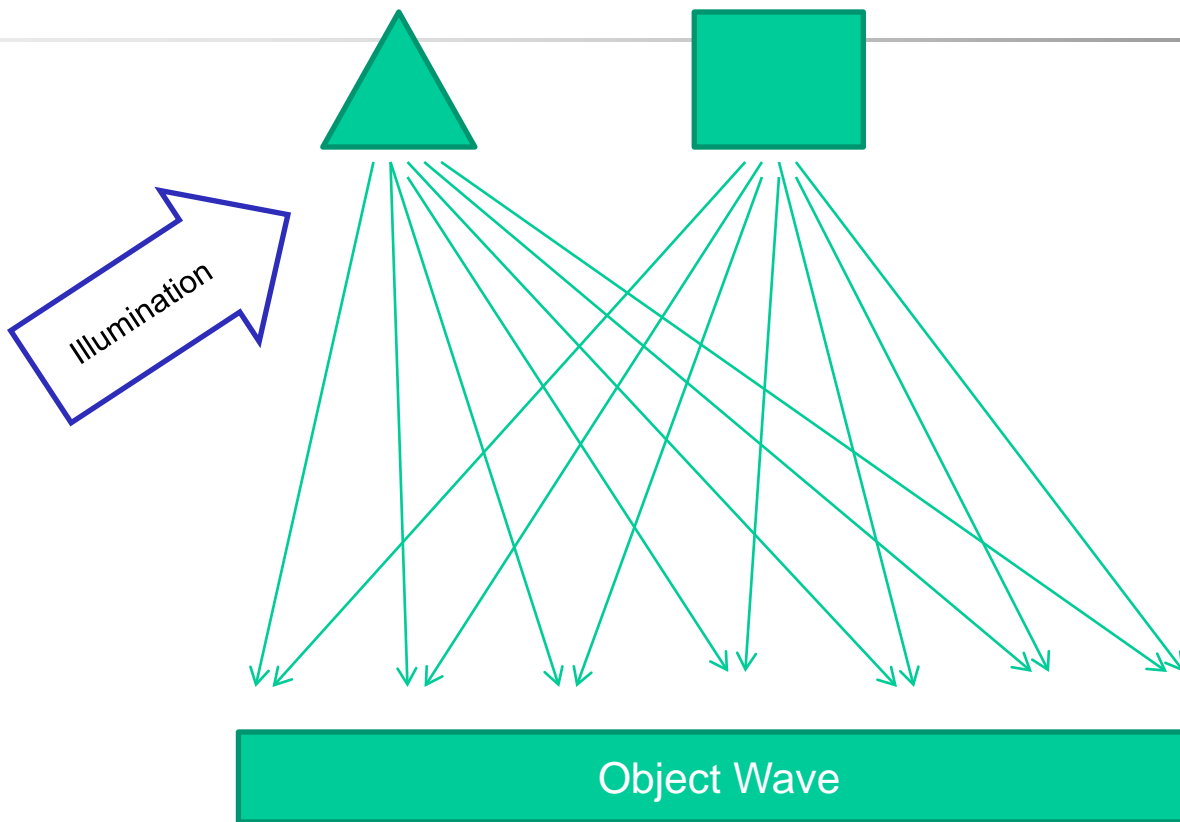
Every minute, every day, somewhere in the world, there is a meeting on 3DTV going on.

- The DVB Project
- The ITU-R
- The SMPTE
- The EBU
- 3D@Home
- The JVT
- The ATSC
- Muscade
- 3DVIVANT
- +.....



Let's go back to basics

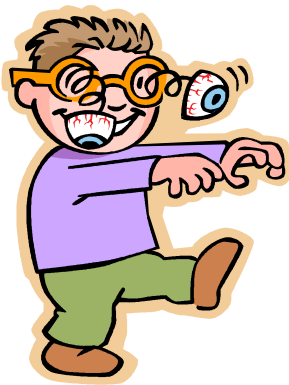




The Object Wave has amplitude, frequency, and phase. I take regular 'samples' in each eye.

What happens in 3D in the mind?

The two pictures from the retinae of the eyes are corrected for distortion, laid one on top of the other, 'fused' by the mind (stereopsis), and projected forward as if seen by a single eye in the forehead (the cyclopean image). Amazing isn't it?



The problem for 3D TV.

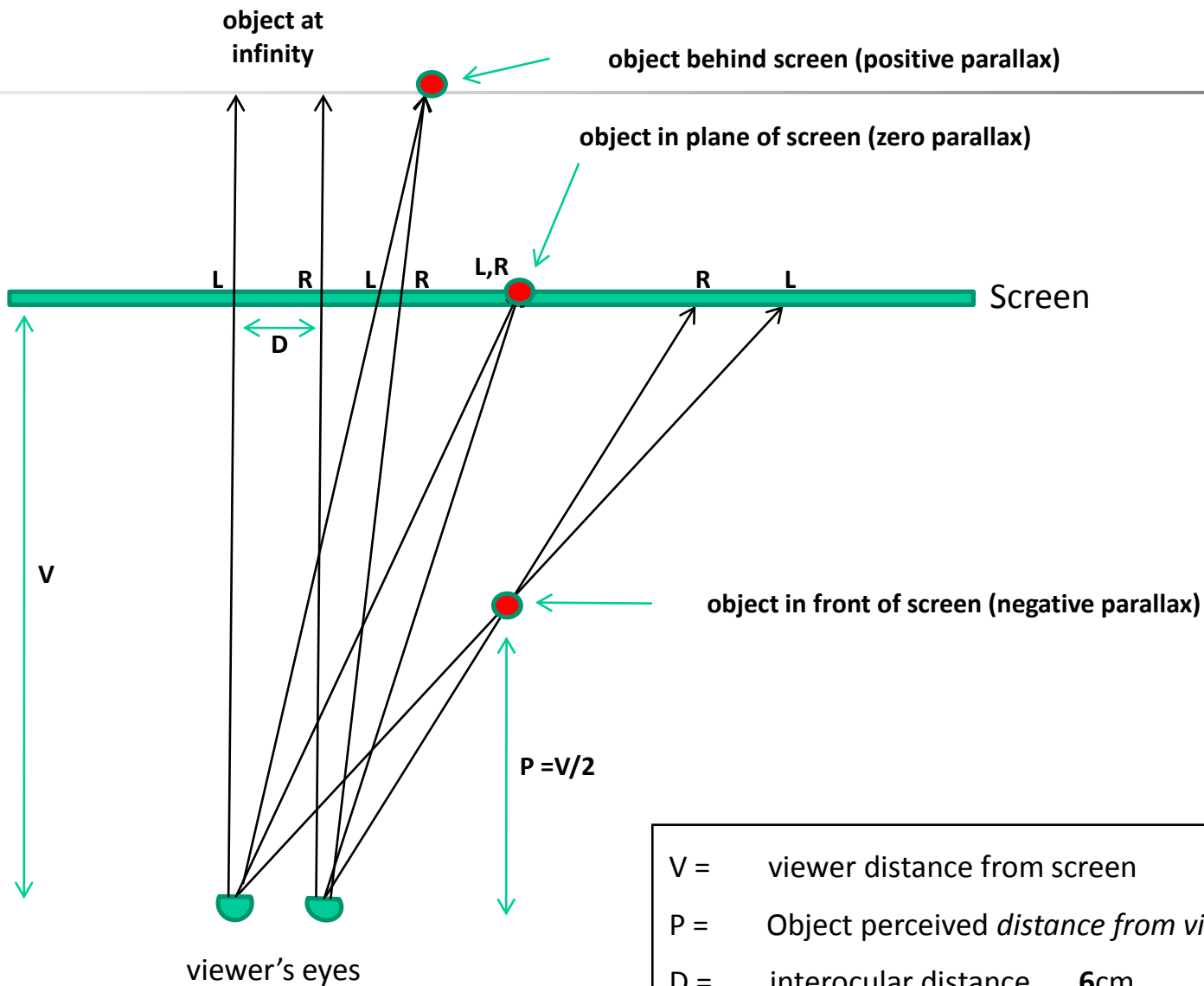
Camera sensors record only the amplitude of the light, not the wavelength or phase.

We get over the problem of wavelengths in Television today by recording 'three pictures' each with 'primary colours'.

We cannot yet record phase in a practical sensor system (though a hologram does this).

Today we start with a limited system of 3DTV ("S3D") and accept limitations.





V = viewer distance from screen
 P = Object perceived *distance from viewer*
 D = interocular distance, 6cm
 L & R = homologous points in left and right eye images

Understand in depth?

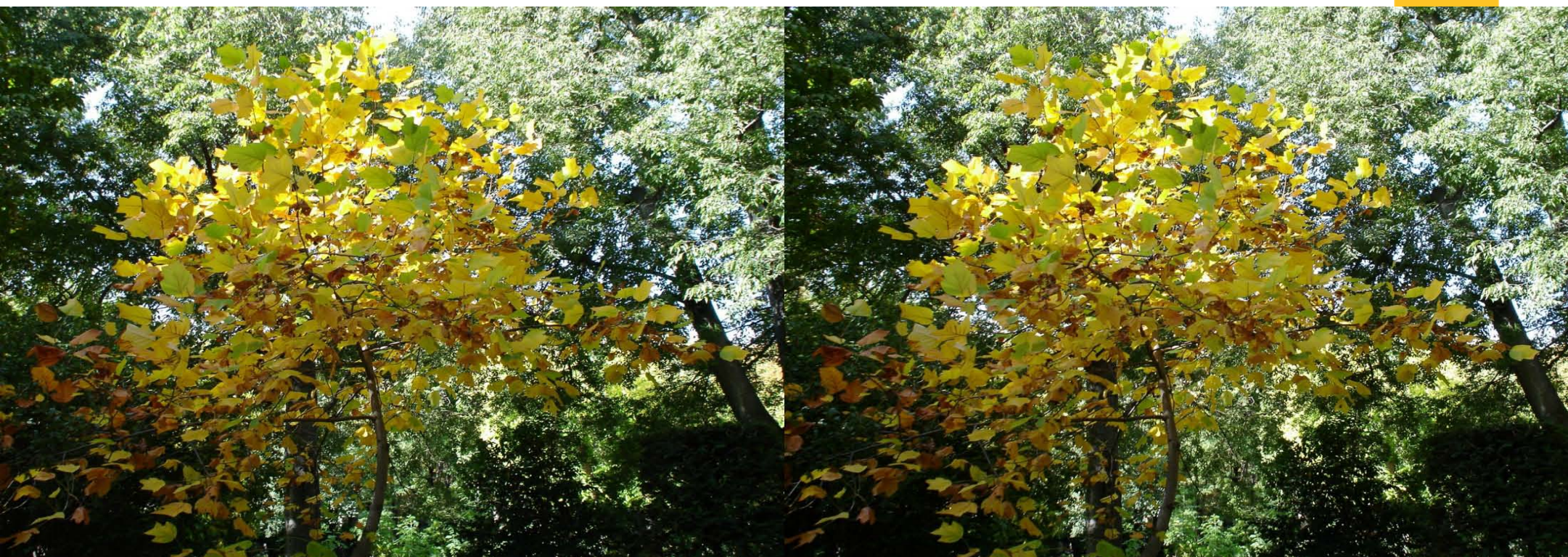
- Same object in each picture = **homologous points**.
- Object projected forward of the screen plane = '**negative parallax**' (right eye object on the left side of left eye object)
- In the screen plane = '**zero parallax**'
- Behind the screen plane = '**positive parallax**' (right eye object on the right side)
- **Geometrical congruency** = relationship between original object and perceived object.
- **Natureless**
- **Eye discomfort and eye fatigue.**

Conventional Service Compatible (CSC) Level 3	2D HD +something	New set top box/ird/3D display		
Frame Compatible Compatible (FCC) Level 3	Frame Compatible + something	New set top box/ird/3D display		
Conventional HD Frame Compatible (CFC) Level 2	Frame Compatible	No new set top box, but 3D display		
Conventional HD Display Compatible (CDC) Level 1	Colour anaglyph	No new equipment		
	Plano-stereoscopic 1 st Gen	Multi-view 2 nd Gen.	Integral TV 3 rd Gen.	Object Wave 4 th Gen.

Is 3D TV compatible with 2D TV?

Yes, but the 2D pictures can be rather boring.





There are a many questions and issues today

Nature of eye discomfort

Rules of production grammar

Production systems

Naturalness

Viewing conditions

Delivery systems

2D compatibility

Evaluation methods



Question: Why has '3D' interest come and gone in cycles?

- There have been cycles of 3D activity about every 25 years in movies.
- There have been 'knock on' cycles in TV too. 1950s (Baird), 1980s (ARD, FT), today (C4, Sky, NBC, Televisa).
- The 'basic concept' today is similar to the past, despite the hype.
- What happens each time?
- Will it happen again?
- What can we learn from history?



Question: How does 3D change viewer behaviour?

Do they view for longer or shorter times?

Is watching it calming or stressing?

Is there more or less retention of the show after viewing?

Is there more or less emotional involvement?

Is it 'plus' or 'minus' compared to HDTV?

Go with 3DTV now or wait for UHDTV?



Conclusions



EBU TECHNICAL



Thank you

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Davidinnov

