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# SUBJECTIVE QUALITY OF SVC-CODED VIDEOS WITH DIFFERENT ERROR-PATTERNS CONCEALED USING SPATIAL SCALABILITY

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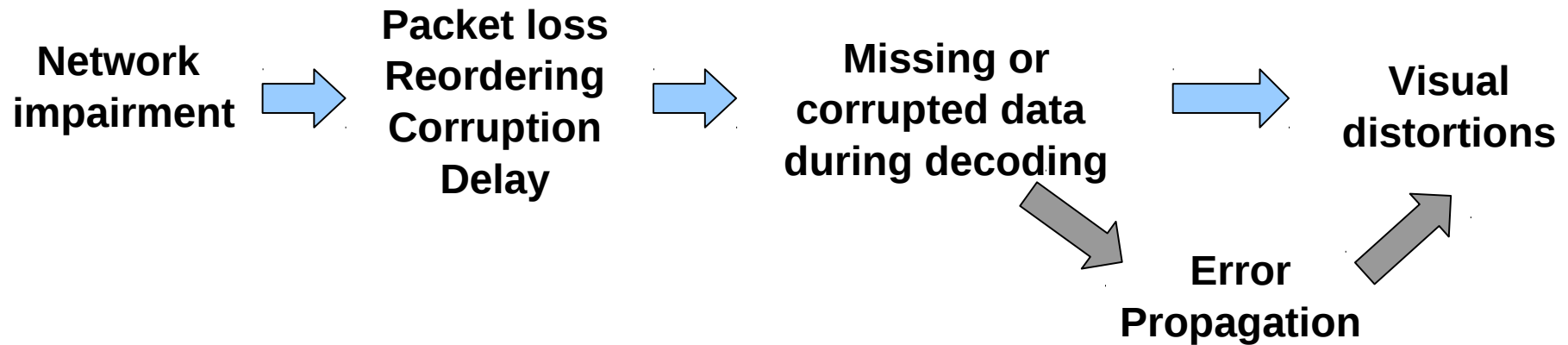
# Subjective quality of SVC-coded videos with different error-patterns concealed using spatial scalability

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*EUVIP 2011, Paris*

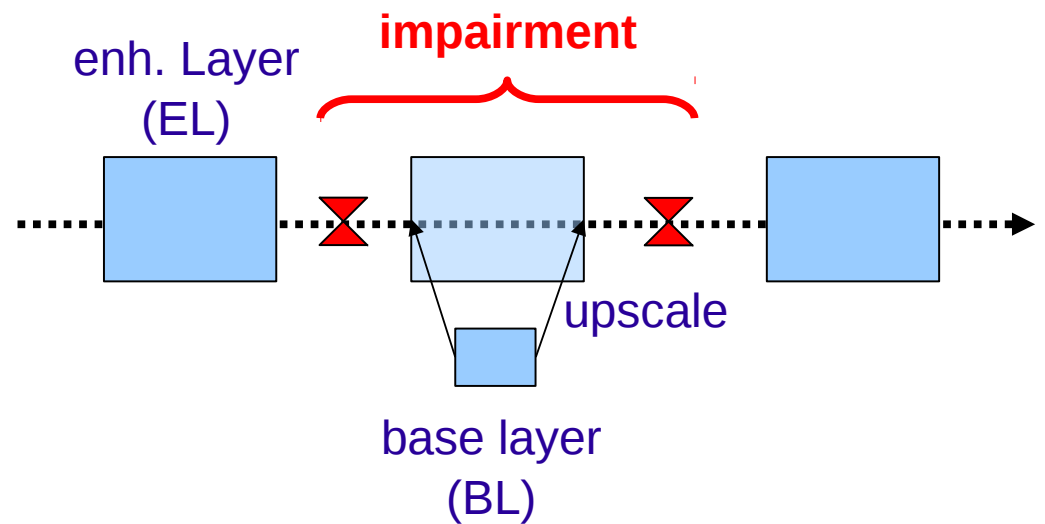
# Network impairments and video transmission



- How to minimize visual distortions?
  - Stream protection
  - Error-concealment

# SVC-based error-concealment

- 2 SVC spatial layers
  - BL : 320x240
  - EL : 640x480
- Loss only in EL
- Hypothesis
  - No loss in base layer  
(base layer protection)



Principle of SVC error-concealment

# Snapshot examples



enhancement layer

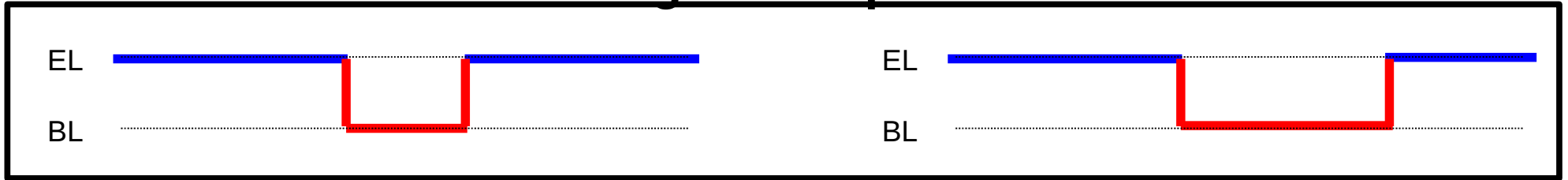


upscaled base layer



# Factors having an impact on perceived quality

## Length of impairment



## Number of impairments



## Interval between impairments



## Base Layer Quality



# Experimental setup

- Content generation :
  - 9 video contents  
12 sec, 30 fps
  - 26 impairment patterns  
+ 1 reference
  - SVC reference encoder  
JSVM v9.18
  - Lanczos upscaler  
QVGA → VGA
  - Impairment simulated on  
the decoded videos (YUV)
  - first and last second not  
impaired
- Test conditions :
  - ACR 5-levels scale  
(ITU-T P.910)
  - Standard viewing conditions  
(ITU-R BT.500)
  - 42" reference screen
  - 28 naïve viewers
  - 2 sessions of 45min with  
5 min break after 20 min

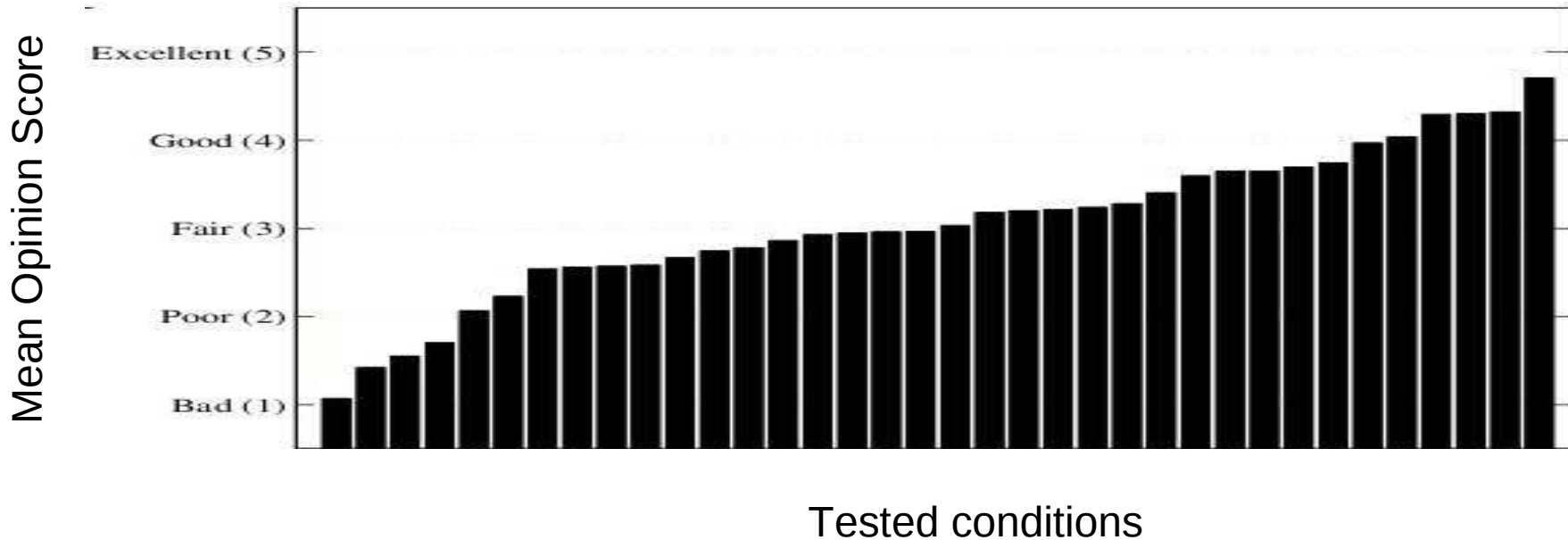


# Impairment patterns

- Systematic approach :
  - Several conditions for each influence factor
- Considered values for each influence factor :
  - Length : {2,8,16,32,64,128}
  - Number : {1,2,3,4}
  - Interval : {8,16,32,64,128}
  - BL Quality : QP = {38,44}

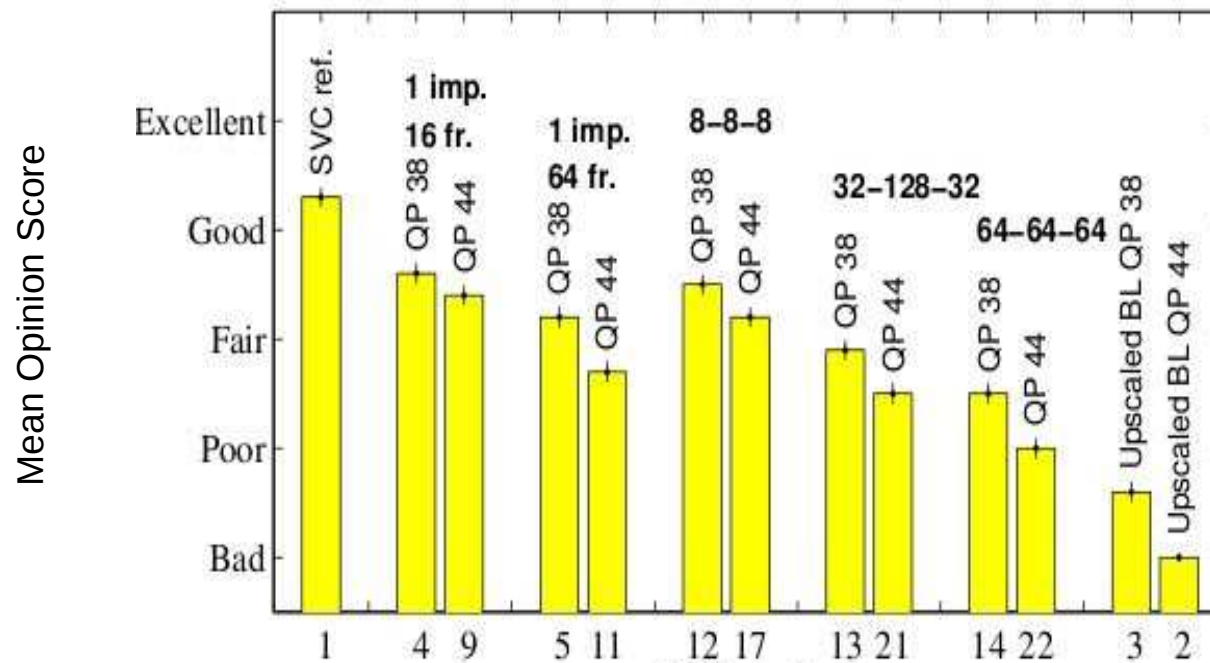


# Experimental results



- Wide and balanced range of qualities
- Statistical significance analysis :
  - Student-t test
  - 95% intervals of confidence (*displayed on next slides*)

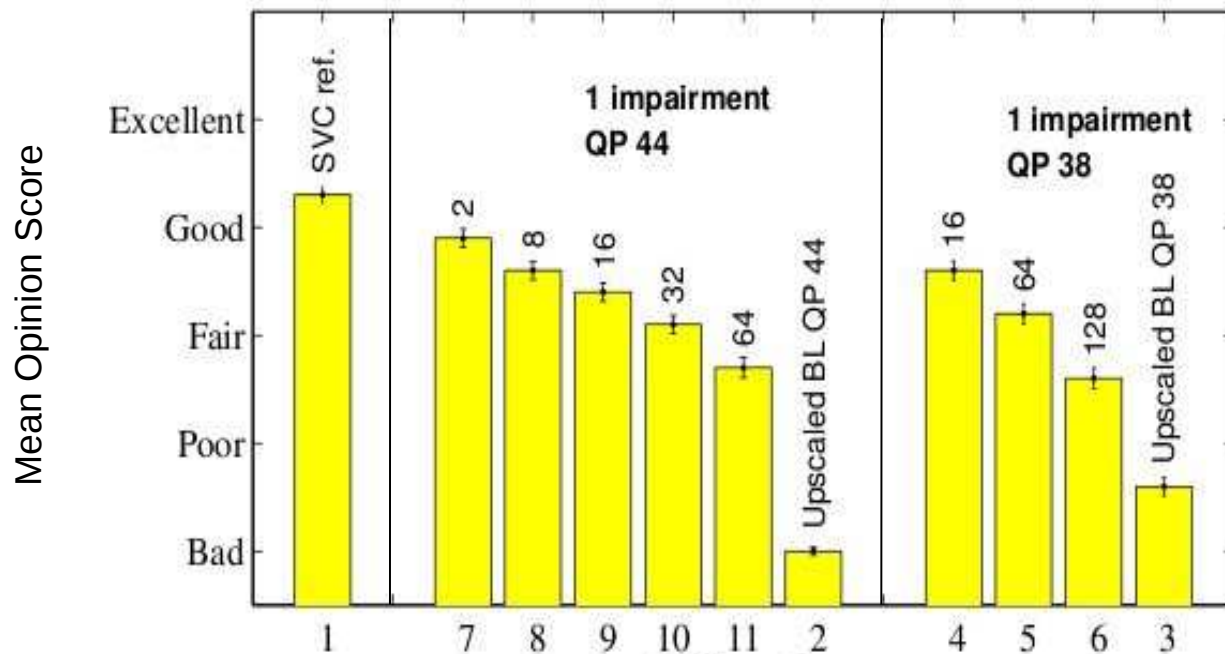
# Impact of base layer quality



95% intervals  
of confidence  
displayed as  
error bars

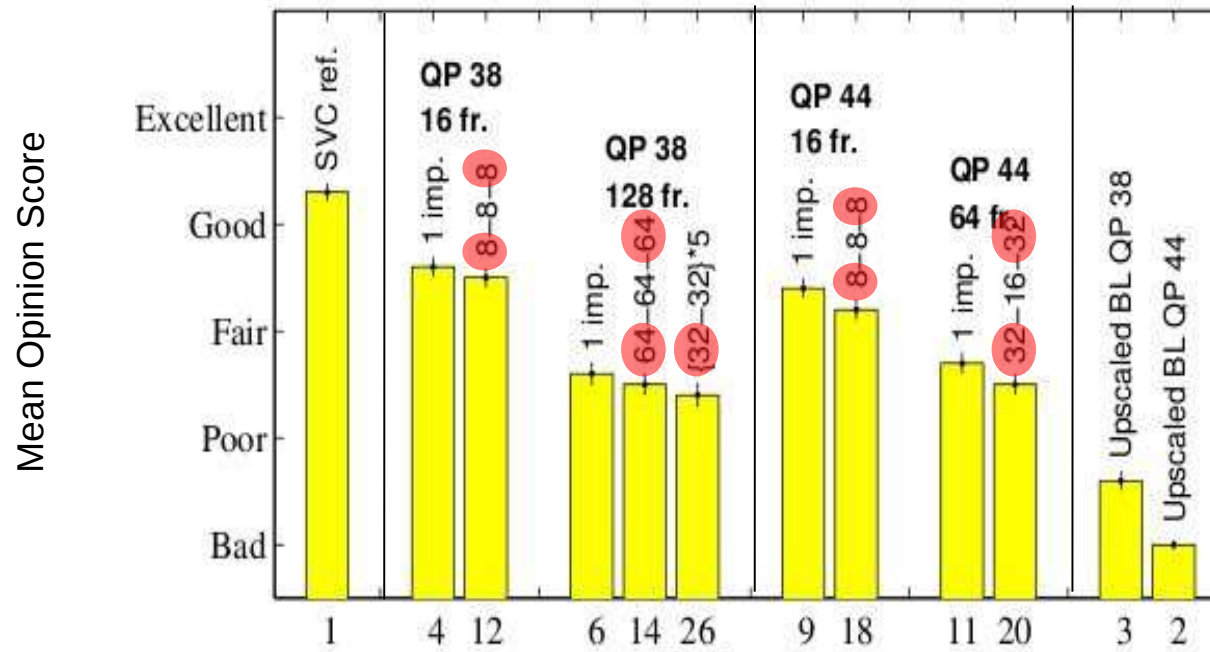
- Significant impact of base layer QP
- Stronger impact for long impairments

# Impact of length of impairments



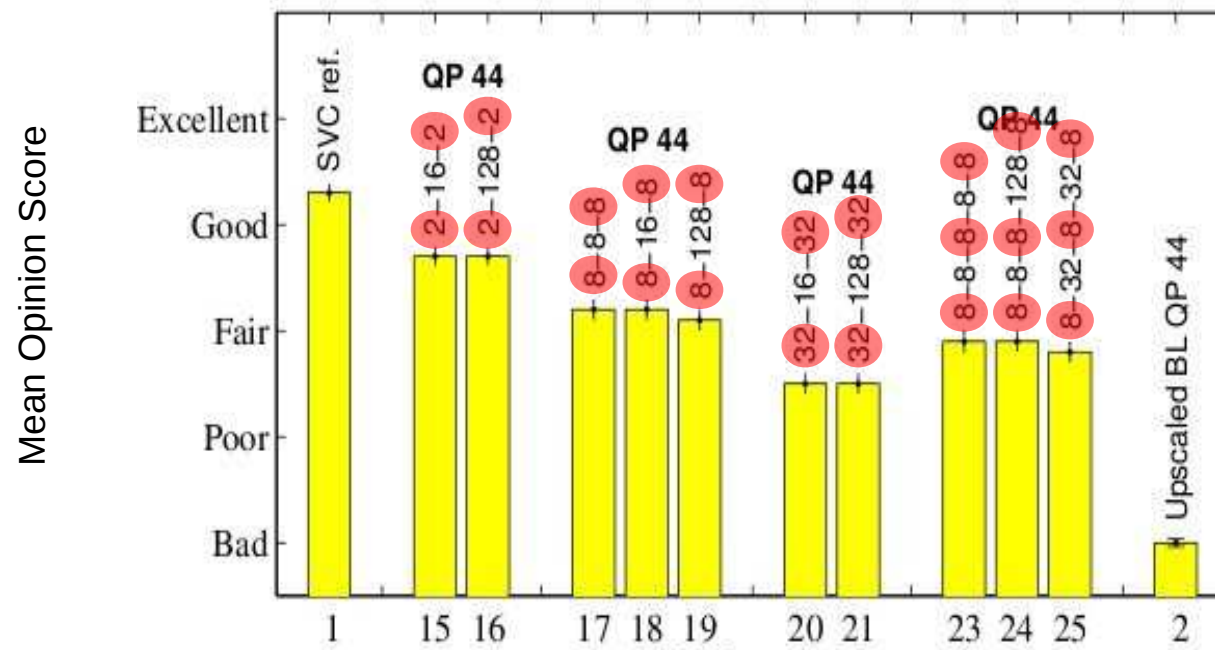
- Significant impact
- Linear decrease of quality / exp. increase of duration
- Slope of the decrease depends on base layer QP

# Impact of number of impairments



- Significant but limited impact
- Depends on base layer QP

# Impact of interval between impairments



- No significant impact !

# Conclusion

- Ordering the influence on quality of the 4 factors :
  1. quality of the base layer > 2. length of impairments
  3. number of impairments > 4. interval between impairments
- Modeling the influence of the parameters
  - Linear decrease with the length of impairments
  - Significant dependence on the base layer coding quality
  - Joint impact of factors
- To be investigated :
  - Influence of the source content
  - Bit-rate constraints
- *Publication of video database*

Thank you for your attention

Questions?

# Impact of impairments on perceived quality

Our goal : ***Study the factors that influence visual quality in this context***

## ***4 factors :***

- Impairments distribution :
  - Length of impairments (cumulated)
  - Number of impairments
  - Interval between impairments
- SVC error concealment :
  - Quality of the base layer (QP)