DRAFT PROTOCOL 01:

TU DELFT LAB EXPERIMENT

VARIUM: Visual Artifacts Interference Understanding and Modeling

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I. RESEARCH QUESTION

This study aims to understand the influence of a set of artifacts and their relationship with the content of a video. It is expected, from a series of psychophysical experiments, to determine the impact of them on visual quality perception. The set of artifacts used in this study were chosen among those perceptually most relevant for digital video applications (e.g. blockiness, blurriness, packet-loss etc). Later, it is expected to design an objective metric for overall video quality considering visual attention and specific spatial and temporal artifacts, their reciprocal impact and their mutual importance for a wide range of video content.

II. EXPERIMENTAL SETUP

For the experimental session, subjects will be requested to score some videos with different combinations of artifacts. Thus, all subjects will assess all experimental stimuli and, during quality scoring, the eye-movements of the subjects will be recorded. It is expected to collect: viewing time per stimulus; scores for each attribute, video and observer; and, eye-tracking data. This experiment will require the resources indicated below:

A. Video Database

The video database used in this experiment was generated from seven high-definition videos (original videos) with 1280×720, 50 fps and 10 seconds duration and that correspond to a diverse content (Basketball, Romeo and Juliet, Park Run, Cactus, Park Joy, Barbecue and Into Trees), as depicted in Figure 1. From the original videos were generated several different degraded versions (more details can be seen in the subsection II B and in the tables I and II).

FIG. 1: Screenshots of the first frame of the sequences included in Experiment.

B. Artifacts

New versions of each original video were generated with different combination of artifacts. Below, a brief comment about the artifacts and the videos versions used:

- The artifacts chosen were blockiness, blurriness and packet-loss [1];
- 7 original videos have been distorted with different combinations of the parameters regulating the amount of packet-loss, blurriness and blockiness;
- 4 different strengths to blockiness and blurriness were used, such as, 0.2%, 0.4%, 0.6% and 0.8% [2];
- Table I shows all the combinations using different blockiness and blurriness strengths. Later, they were applied in each original video versions, resulting in new degraded videos;
- It was used 3 different packet loss ratio, PckErr_1 $= 0.7\%$, PckErr_2 $= 2.6\%$ and PckErr_3 $= 8.1\%$ [3]. Later, they were applied in 2, 3, 8, 10, 11, 12, 14 and 15 degraded video versions. Table II shows these combinations ($PckErr\_1 + 2$ is the combination between packet loss ratio 0.2% and degraded video version 2, and so on);

Combination	Blocky	Blurry
1	0.0	0.2
2	0.0	0.4
3	0.0	0.6
4	0.2	0.0
5	0.2	0.2
6	0.2	0.4
7	0.2	0.6
8	0.4	0.0
9	0.4	0.2
10	0.4	0.4
11	0.4	0.6
12	0.6	0.0
13	0.6	0.2
14	0.6	0.4
15	0.6	0.6
16	0.0	0.8
17	0.8	0.0

TABLE I: Strength of each artifacts (blockiness and blurriness) and their combinations used to generate the degraded videos.

Thus, the 41 combinations (blockiness, blurriness and packet loss) $\times 7$ (videos versions) $+7$ original videos will generate a database with 294 videos. So, some choices must be made on which videos to select once this is a large amount to be judged in a single experiment. Those choices could base on the results of the previous experiments, as following:

1. Total time consuming to execute overall experiment;
2. To consider just the overlapping of the three artifacts packet loss, blockiness and blurriness;

[1] These artifacts have been used in the previous experiments of this project.
[2] These blockiness and blurriness strengths have been used in the previous experiments of this project.
[3] These packet loss ratio have been used in the previous experiments of this project.

Combination	Packet-Loss	Blocky	Blurry
$PckErr\_1 + 2$	0.7	0.0	0.4
$PckErr\_2 + 2$	2.6	0.0	0.4
$PckErr\_3 + 2$	8.1	0.0	0.4
$PckErr\_1 + 3$	0.7	0.0	0.6
$PckErr\_2 + 3$	2.6	0.0	0.6
$PckErr\_3 + 3$	8.1	0.0	0.6
$PckErr\_1 + 8$	0.7	0.4	0.0
$PckErr\_2 + 8$	2.6	0.4	0.0
$PckErr\_3 + 8$	8.1	0.4	0.0
$PckErr\_1 + 10$	0.7	0.4	0.4
$PckErr\_2 + 10$	2.6	0.4	0.4
$PckErr\_3 + 10$	8.1	0.4	0.4
$PckErr\_1 + 11$	0.7	0.4	0.6
$PckErr\_2 + 11$	2.6	0.4	0.6
$PckErr\_3 + 11$	8.1	0.4	0.6
$PckErr\_1 + 12$	0.7	0.6	0.0
$PckErr\_2 + 12$	2.6	0.6	0.0
$PckErr\_3 + 12$	8.1	0.6	0.0
$PckErr\_1 + 14$	0.7	0.6	0.4
$PckErr\_2 + 14$	2.6	0.6	0.4
$PckErr\_3 + 14$	8.1	0.6	0.4
$PckErr\_1 + 15$	0.7	0.6	0.6
$PckErr\_2 + 15$	2.6	0.6	0.6
$PckErr\_3 + 15$	8.1	0.6	0.6
$PckErr\_1 + 16$	0.7	0.0	0.8
$PckErr\_2 + 16$	2.6	0.0	0.8
$PckErr\_3 + 16$	8.1	0.0	0.8
$PckErr\_1 + 17$	0.7	0.8	0.0
$PckErr\_2 + 17$	2.6	0.8	0.0
$PckErr\_3 + 17$	8.1	0.8	0.0

TABLE II: Combinations of the packet loss ratio (PckErr $1, 2$ and 3) with blockiness and blurriness artifacts.

3. The narrowing down the parameters to [4]:
   (a) Packet Loss: 0.2%, 2.6% and 8.1%;
   (b) Blockiness: 0.4% and 0.6%;
   (c) Blurriness: 0.4% and 0.6%.
4. Some artifacts can eliminating or reducing others artifact of according its strength (for example, if it add blockiness to a video and later filter the video for adding blurriness, the last operation would probably eliminate a good amount of blockiness);

[4] Values taken of the Experiment3_setup document that considering all non-existing combinations.

Thus, taking into account the goal of this experiment and these choices, it would result into 30 combinations $\times 7$ (video versions) $+7$ original videos $= 217$ videos.

A list of all videos used in the experiment can be seen in Appendix A.

C. Apparatus

In a room with constant illumination at approximately 70 lux, each subject will access the stimuli on a $23''$ LED blacklight monitor having a resolution of 1360×768 pixels. The subjects will be seated straight ahead of the monitor, centered at or slightly below the eye height for most subjects. A chinrest will be used to guarantee a constant distance between the subject's eyes and the monitor. The room has a table, 2 chairs, a chinrest, 2 CPUs, mouses and keyboards , 2 displays and a *SensoMotoric Instruments* GmbH Eye Tracker.

The Eye-Tracker will be used for tracking the pupil and gaze position during the experiment. The distance between the subject's eyes and the video monitor will be 3 times the monitor screen's height. The user interface for the experiment was implemented using the *Neurobehavioral Systems* software Presentation.

The experiment will take place at the Faculty of Electrical Engineering, Mathematics and Computer Science of TU Delft, in a designated laboratory space - HB 12.150 and 12.160 rooms.

III. SUBJECTS AND RECRUITMENT

It is expected to recruit about 20 subjects from the student and staff population at TU Delft observers. This recruitment will be done via poster (Figure 2) and publication in the Facebook Groups (i.e, in groups related to student and staff of TU Delft). In some cases, some subjects can be excluded due:

- Vision problems that are not corrected such as colour-blindness;
- Visible abnormality of the eyes like strabismus;
- Wearing glasses or contact lenses;
- Lighter-coloured eyes.

IV. EXPERIMENTAL METHODOLOGY

The overall experiment will be run one subject at a time and it is split into five tasks (Figure 3). Below there are a short comment about each task.

1. **Equipment Calibration:** in this session the Eye-tracker will be calibrate. This step is essential for tracking the pupil and gaze position during the experiment;
2. **Free Viewing:** in this session will be asked to the participants to freely look at seven high quality videos (original movies), as if they watching TV at home;
3. **Training task:** this session will give an idea of the range of quality that the subjects will be seeing. It is split in two parts: first part has high quality videos and second part has strongly degraded videos;
4. **Practice Trials:** In the fourth session will be showed some videos sequences to be sure that subjects understand the task. Subjects will be asked to perform the exact same tasks like in the main experiment;

FIG. 2: Poster used for recruitment.

5. **Main Experimental Session:** in this is session will be presented all videos (test sequences) in random order. After each test sequence played, the subject will be asked "Did you perceive any impairments or defects in the video?", prompting for a "yes" or "no" answer (detection task). Then participants will be asked to perform the annoyance task consisting of giving a numerical judgment of how annoying the detected impairment is.

V. PROCEDURE

Videos will be shown in a randomized order, different for each participant. Each video will be scored through a slider with a continuous scale from 0 (lower bound) to 10 (upper bound), with 5 being the mid

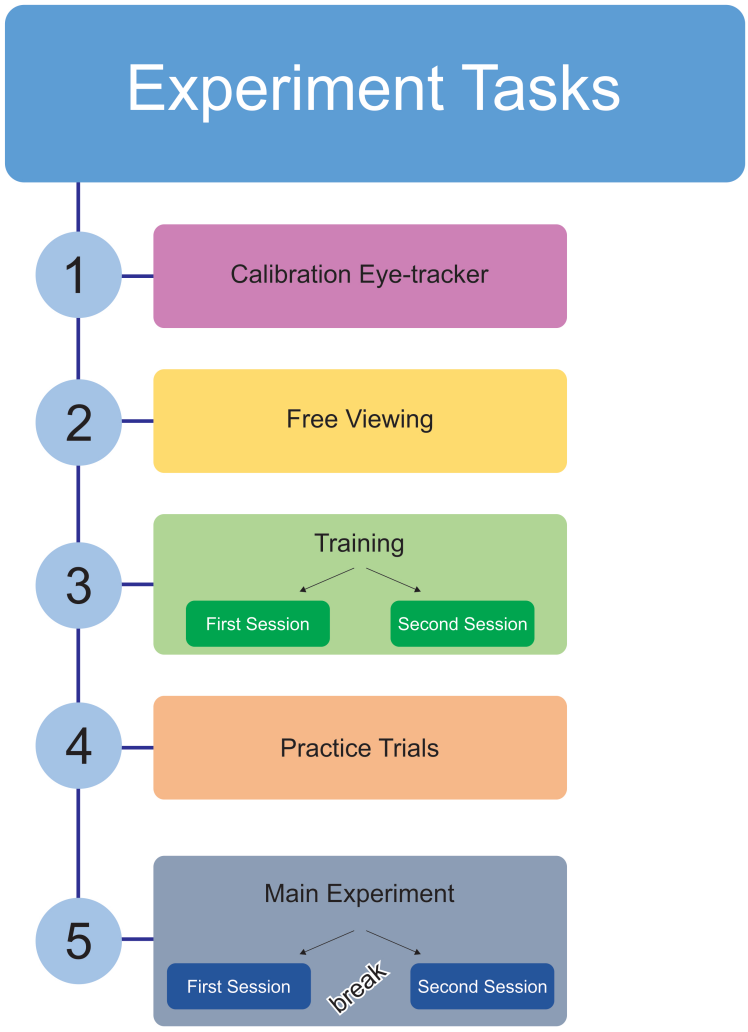

FIG. 3: Experiment overview.

value. Each scoring scale has 2 semantic labels for the lower ("Imperceptible") and upper bound ("Very Annoying"), at the beginning and end, respectively.

During the experiment, one video at a time will be showed and, after examination, the slider will appear in a separate scoring screen. Participants enter their judgment by simply positioning the slider on the appropriate score number (continuous scale) through the computer mouse. After scoring (regarding defects), another video will be displayed, and the process will be repeated until the all videos are showed for the participant. Figure 4 shows an example of the slider.

A. Experiment - Details

During the experiment, the experimenter will be guiding the subject through all sessions of the experiment, so that everything can be understood clearly. The following basic steps for the experiment will be followed:

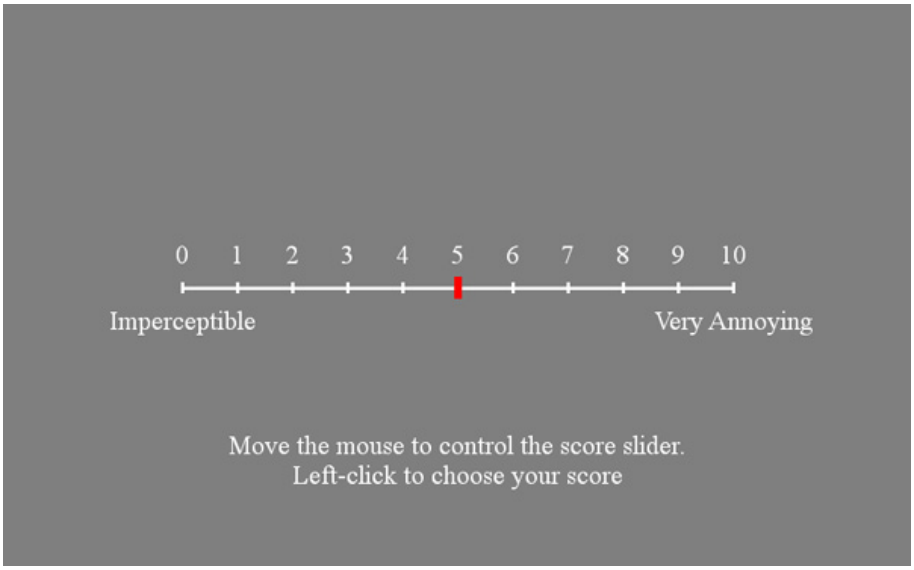

FIG. 4: Scoring screen (slider).

1. **Inform the participant**

   - ***Goal*:** The goal of this experiment is to unveil the annoyance brought about by combinations of three different artifacts (Packet Loss, Blockiness and Blurriness).
   - ***Scoring screen*:** Each video will be scored through a slider with a continuous scale from 0 ("Imperceptible") to 10 ("Very Annoying"), with 5 being the mid value. An example of the scoring screen will be shown to the participant so that he/she can get familiar with it.
   - ***Questions or doubts*:** The participant can ask at any given time any question or doubt that he/she might have.
   - ***General procedure*:** The experiment is split in 5 sessions: an equipment calibration task, a free view task, a training session (split in two parts), a practice trials and, a main experiment (split in two parts with a break and another equipment calibration in between).

2. **General procedure details**

   (a) **Calibration task:** Participants' eye movements will be tracked to investigate how an observer scans videos. The distance from the monitor to the participant's eyes is very important, and so, the participant will need:

      i. to place his/her chin in the chinrest;
      ii. to avoid leaning backwards;
      iii. to look at different places in the screen in order for the experimenter to adjust the system according to the iris and pupil of the participant.

   Once the system is ready, the experimenter will ask the participant to continue. The eye-tracker tool will need to be calibrated with a simple task:

      i. ***Task*:** The observer will have to concentrate on a black square in the screen, and follow it with his/hers eyes every time the square changes its position.
         - During this task, the experimenter is only allowed to finish it if there is a problem, i.e., the experimenter should not interfere with the elapsing procedure.

- One might be that the calibration task does conclude or that was not successful. In those cases, the calibration task can be repeated up to 3 times. If the problem persists, the experiment will have to come to an end and the participant will be dismissed.

ii. ***After task*:** Once the calibration is complete, the experimenter will ask the observer to look at different places in the screen to confirm that the calibration was successful.

- If at any moment the participant moves his/hers face and the eye-tracker loses the participant's pupil or/and iris, the experimenter is allowed to correct the eye-tracker tool position, so that it can continue tracking the participant's eye movements. Moreover, the experimenter can try to correct some Eye-Tracker parameters when the subject is looking at one of the videos.

(b) **Training task:** The participants will be performing 2 short training sessions. This task is concerned with defects or impairments in video and their effect on human viewers. Thus, in the first session will be showed high-definition videos and next session strongly degraded videos. This task is so important to give them an idea of the range of quality that they will be seeing. The data from the training sessions will not be used for the study.

(c) **Practice Trials:** The participants will have a practice trial to be sure that they understand the task. The most important is to know the initial impressions from the subjects after the video is played. Thus, they will be asked to estimate the annoyance of defects or impairments in the video. The defects can be found in any region of video and at any time during the clip. After the clip is played, the participants will be asked: "Did you see any defect or impairment?". Here, there are two possibilities:

i. Answer NO: if the participant did not see a defect (and, the experiment continues);

ii. Answer YES: if the participant detected a defect or impairment. Thus, they will be asked to indicate the annoyance of the defect their have seen using a continuous scale with values ranging from 0 to 10. It is to assign an annoyance value of 10 to the most annoying video. If the annoyance value of a defect in the experiment is half of the worst sample clip, the participant will give it a 5; if it is $1/10$th as bad, the participant will give it a 1. If the defect did not annoy the participant at all, score will be 0.

The same questions will be asked after every trial. The data from the practice trials will not be used for the study, so it isn't a problem if the participant makes a mistake.

(d) **Experiment:** Before the experiment starts, important advices will be provided to the participant:

- *If he/she entered data incorrectly*: The participant should let the experimenter know. The experimenter will make note of the time as indicated in the iView interface and fix it later.

- *If he/she needs to take a small break*: The participant should finish viewing the current video, and rest before entering the corresponding score, avoiding proceeding to the next video.

- *If he/she feels confused about what to do*: The participant should stop and let the experimenter know if he/she has a question or doubt.

The experiment is split in 2 sessions and each one should last approximately 25 minutes. As in Practice Trials, they will be asked to estimate the annoyance of defects or impairments of each degraded video.

i. **Session** 1**:** Once the participant has scored all videos of this session, it will be given a break to he/she. The break will not have a limit time defined, but it is expected that the participant begins the second session as soon as possible. Once the participant is ready to continue, he/she will be instructed to begin the next session.

ii. **Session** 2**:** Before the beginning of this session the calibration task will be repeated. When the system is ready, the experimenter will ask to the participant to proceed to the calibration task. Once the calibration task is finished, the participant will rate the remaining videos. When is finished, he/she may leave the room. A more detailed explanation about the experiment itself can be given to the participant, if asked.

B. Experimental Instructions

1. **Before the subject arrives:**
   (a) Log in to the server
   (b) Initiate application
2. **After the subject arrives:**
   (a) Sit the subject in the chair, centered in front of the video monitor. The subject should be adjusted backward or forward to get a distance of 3 times the height of the picture in the video monitor screen. The most comfortable position for the subject tends to be leaning forward slightly with forearms or elbows on the table. The distance from the monitor to your eyes is important during the presentation. The subject should be instructed not to lean backward;
   (b) "The experiment is split in five sessions: equipment calibration, free viewing, training, practice trials, and main experimental session. At the beginning of each session, I will briefly explain what you are required to do at each stage.";
   (c) Eye-Tracking calibration: A screen will appear asking the subject to wait while you adjust the camera and try to capture the pupil. Adjust the system to the more stable settings. When you are finished, instruct the subject to advance. Then instruct him/her to follow the black squares in the screen. Press the *space bar* to start the calibration;
   (d) Free viewing: "At this stage, you will be asked to watch seven high quality videos (original videos). All videos have ten seconds.";
   (e) [Play seven original videos];
   (f) "This study is concerned with defects or impairments in video images and their effect on human viewers. We are not concerned with the content of the videos. We are interested in whether or not you see any defects or impairments in the videos that we will show, and if so, how annoying (strong) the defect is.";
   (g) Training session: "Here is how you will determine the annoyance/strength value. I am about to show you a set of sample clips. The sample clips include two sets of videos. The first set has four high quality videos and the second set has four degraded quality videos. There may be some impairment in the high quality clips. This will give you an idea of the range of image quality that you will be seeing. You are to assign an annoyance value of 10 to the most annoying video among the sample clips.";
   (h) Practice Trials: "Before we start the experiment, you will have 6 practice trials to be sure that you understand the task. You will be asked to perform the exact same tasks you will perform in the main experiment. You will respond in these trials just like you will in the main experiment. We will not use the data from the practice trials, so do not be concerned if you make a mistake here. If you have any questions or concerns, ask the experimenter at any time.";

   You will be presented with one video clip on each trial. Each clip will last ten seconds and will be played once. After the clip is played, questions will appear on the monitor. The same questions will be asked after every trial. Do not spend a lot of time thinking about your responses. We

want to know your initial impressions;

You will be asked to estimate the annoyance of defects or impairments in the video. The defects can be found in any region of video and at any time during the clip. After the clip is played, you will be asked "Did you see any defect or impairment"?

"If you did not see a defect, answer NO. Then, Left-click to see the next the video."
"For those clips in which you do detect a defect or impairment, answer YES. You will be then asked to indicate the annoyance of the defect you saw using a continuous scale with values ranging from 0 and 10 will appear. You are to assign an annoyance value of 10 to the most annoying video. If the annoyance value of a defect in the experiment is half of the worst sample clip, give it a 5; if it is $\frac{1}{10}$th as bad, give it a 1. If the defect did not annoy you at all, call it 0. You should enter the scores using the mouse to click on the desired value. After you finished entering your choice of number, Left-click to see the next the video.";

(i) [Start the main Experiment];

(j) The experiment is divided in two parts. Each part should last approximately 25 minutes. A break will be given after the first part of the experiment is finished.

"Do you have any questions?"

(k) "You can take a break at any time by entering your answers for the most recent video, but waiting to *Left-click* until you are ready to go on. You should stop if you are confused about what to do, if you realize you have entered data incorrectly, or if you need a break. You can't stop the video from playing or go back and fix the data from a previous clip afterwards. So if something goes wrong, watch the video and then tell the experimenter. We will go back and fix it later. The questions will come up on the computer screen, but you should not need to look over at it every time. The questions will not change.";

(l) First part will be showed some video sequences. When the first part is finished, a break will be given.

(m) After break, it will be asked if the participant is ready to continue. It will be necessary to perform the calibration task again. When the system is ready, the experimenter will ask he/she to proceed to the task.

(n) Second part will be showed remaining video sequences. When this part is finished, the experiment will be completed and the participant may leave the room.

3. All *Instructions* used in this experiment are showed in Appendix B.

APPENDIX A: ALL VIDEO LIST USED IN OVERALL EXPERIMENT

ORIGINAL VIDEO LIST

Video	Packet-Loss	Blocky	Blurry
blkblr_v1_1280 × 720_0	0.0	0.0	0.0
blkblr_v7_1280 × 720_0	0.0	0.0	0.0
blkblr_v8_1280 × 720_0	0.0	0.0	0.0
blkblr_v9_1280 × 720_0	0.0	0.0	0.0
blkblr_v10_1280 × 720_0	0.0	0.0	0.0
blkblr_v11_1280 × 720_0	0.0	0.0	0.0
blkblr_v12_1280 × 720_0	0.0	0.0	0.0

TABLE III: Original video list used during Free-viewing session.

TRAINING VIDEO LIST

Video	Packet-Loss	Blocky	Blurry
blkblr_v2_1280 × 720_0	0.0	0.0	0.0
blkblr_v3_1280 × 720_0	0.0	0.0	0.0
blkblr_v4_1280 × 720_0	0.0	0.0	0.0
blkblr_v5_1280 × 720_0	0.0	0.0	0.0

TABLE IV: Original video list used during Training session.

Video	Packet-Loss	Blocky	Blurry
blkblr_v2_1280 × 720_17	0.0	0.8	0.0
blkblr_v3_I12_PckErr3	8.1	0.0	0.0
blkblr_v4_1280 × 720_16	0.0	0.0	0.8
blkblr_v5_I12_15_PckErr3∗	8.1	0.6	0.6

TABLE V: Degraded video list used during Training session.

PRACTICE TRIAL LIST

Video	Packet-Loss	Blocky	Blurry
blkblr_v2_1280 × 720_0	0.0	0.0	0.0
blkblr_v2_1280 × 720_10∗	0.0	0.4	0.4
blkblr_v3_I12_10_PckErr1∗	0.7	0.4	0.4
blkblr_v3_I12_PckErr2	2.6	0.0	0.0
blkblr_v4_I12_12_PckErr2∗	2.6	0.6	0.0
blkblr_v4_I12_11_PckErr2∗	2.6	0.0	0.6
blkblr_v5_I12_16_PckErr2∗	2.6	0.6	0.6
blkblr_v5_I12_PckErr3	8.1	0.0	0.0
blkblr_v6_I12_8_PckErr3∗	8.1	0.4	0.0
blkblr_v6_I12_2_PckErr3∗	8.1	0.0	0.4

TABLE VI: Video list used during Practice Trial session.

VIDEO LIST OF MAIN EXPERIMENT

Combination	Packet-Loss	Blocky	Blurry
blkblr_v1_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v1_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v1_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v1_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v1_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v1_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v1_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v1_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v1_I12_8_PckErr3	8.1	0.4	0.0
blkblr_v1_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v1_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v1_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v1_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v1_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v1_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v1_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v1_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v1_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v1_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v1_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v1_I12_14_PckErr3	8.1	0.6	0.4
blkblr_v1_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v1_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v1_I12_15_PckErr3	8.1	0.6	0.6

Combination	Packet-Loss	Blocky	Blurry
blkblr_v1_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v1_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v1_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v1_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v1_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v1_I12_17_PckErr3	8.1	0.8	0.0
blkblr_v7_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v7_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v7_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v7_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v7_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v7_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v7_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v7_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v7_I12_8_PckErr3	8.1	0.4	0.0
blkblr_v7_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v7_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v7_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v7_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v7_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v7_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v7_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v7_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v7_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v7_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v7_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v7_I12_14_PckErr3	8.1	0.6	0.4
blkblr_v7_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v7_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v7_I12_15_PckErr3	8.1	0.6	0.6
blkblr_v7_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v7_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v7_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v7_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v7_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v7_I12_17_PckErr3	8.1	0.8	0.0
blkblr_v8_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v8_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v8_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v8_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v8_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v8_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v8_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v8_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v8_I12_8_PckErr3	8.1	0.4	0.0

Combination	Packet-Loss	Blocky	Blurry
blkblr_v8_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v8_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v8_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v8_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v8_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v8_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v8_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v8_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v8_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v8_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v8_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v8_I12_14_PckErr3	8.1	0.6	0.4
blkblr_v8_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v8_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v8_I12_15_PckErr3	8.1	0.6	0.6
blkblr_v8_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v8_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v8_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v8_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v8_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v8_I12_17_PckErr3	8.1	0.8	0.0
blkblr_v9_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v9_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v9_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v9_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v9_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v9_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v9_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v9_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v9_I12_8_PckErr3	8.1	0.4	0.0
blkblr_v9_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v9_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v9_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v9_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v9_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v9_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v9_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v9_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v9_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v9_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v9_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v9_I12_14_PckErr3	8.1	0.6	0.4
blkblr_v9_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v9_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v9_I12_15_PckErr3	8.1	0.6	0.6

Combination	Packet-Loss	Blocky	Blurry
blkblr_v9_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v9_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v9_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v9_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v9_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v9_I12_17_PckErr3	8.1	0.8	0.0
blkblr_v10_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v10_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v10_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v10_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v10_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v10_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v10_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v10_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v10_I12_8_PckErr3	8.1	0.4	0.0
blkblr_v10_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v10_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v10_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v10_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v10_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v10_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v10_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v10_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v10_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v10_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v10_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v10_I12_14_PckErr3	8.1	0.6	0.4
blkblr_v10_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v10_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v10_I12_15_PckErr3	8.1	0.6	0.6
blkblr_v10_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v10_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v10_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v10_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v10_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v10_I12_17_PckErr3	8.1	0.8	0.0
blkblr_v11_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v11_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v11_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v11_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v11_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v11_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v11_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v11_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v11_I12_8_PckErr3	8.1	0.4	0.0

Combination	Packet-Loss	Blocky	Blurry
blkblr_v11_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v11_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v11_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v11_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v11_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v11_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v11_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v11_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v11_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v11_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v11_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v11_I12_14_PckErr3	8.1	0.6	0.4
blkblr_v11_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v11_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v11_I12_15_PckErr3	8.1	0.6	0.6
blkblr_v11_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v11_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v11_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v11_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v11_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v11_I12_17_PckErr3	8.1	0.8	0.0
blkblr_v12_I12_2_PckErr1	0.7	0.0	0.4
blkblr_v12_I12_2_PckErr2	2.6	0.0	0.4
blkblr_v12_I12_2_PckErr3	8.1	0.0	0.4
blkblr_v12_I12_3_PckErr1	0.7	0.0	0.6
blkblr_v12_I12_3_PckErr2	2.6	0.0	0.6
blkblr_v12_I12_3_PckErr3	8.1	0.0	0.6
blkblr_v12_I12_8_PckErr1	0.7	0.4	0.0
blkblr_v12_I12_8_PckErr2	2.6	0.4	0.0
blkblr_v12_I12_8_PckErr3	8.1	0.4	0.0
blkblr_v12_I12_10_PckErr1	0.7	0.4	0.4
blkblr_v12_I12_10_PckErr2	2.6	0.4	0.4
blkblr_v12_I12_10_PckErr3	8.1	0.4	0.4
blkblr_v12_I12_11_PckErr1	0.7	0.4	0.6
blkblr_v12_I12_11_PckErr2	2.6	0.4	0.6
blkblr_v12_I12_11_PckErr3	8.1	0.4	0.6
blkblr_v12_I12_12_PckErr1	0.7	0.6	0.0
blkblr_v12_I12_12_PckErr2	2.6	0.6	0.0
blkblr_v12_I12_12_PckErr3	8.1	0.6	0.0
blkblr_v12_I12_14_PckErr1	0.7	0.6	0.4
blkblr_v12_I12_14_PckErr2	2.6	0.6	0.4
blkblr_v12_I12_14_PckErr3	8.1	0.6	0.4

Combination	Packet-Loss	Blocky	Blurry
blkblr_v12_I12_15_PckErr1	0.7	0.6	0.6
blkblr_v12_I12_15_PckErr2	2.6	0.6	0.6
blkblr_v12_I12_15_PckErr3	8.1	0.6	0.6
blkblr_v12_I12_16_PckErr1	0.7	0.0	0.8
blkblr_v12_I12_16_PckErr2	2.6	0.0	0.8
blkblr_v12_I12_16_PckErr3	8.1	0.0	0.8
blkblr_v12_I12_17_PckErr1	0.7	0.8	0.0
blkblr_v12_I12_17_PckErr2	2.6	0.8	0.0
blkblr_v12_I12_17_PckErr3	8.1	0.8	0.0

TABLE VII: Degraded videos used in the Main Experiment.

APPENDIX B: INSTRUCTIONS SHOWED DURING THE EXPERIMENT

1^{st} **Instruction:**
Please type in your name and press return

2^{nd} **Instruction:**
Welcome! Thank you for participating in this experiment. The experiment is divided in 5 *sessions:*
(1) *Equipment Calibration,*
(2) *Free Viewing,*
(3) *Training,*
(4) *Practice Trials,*
(5) *Main Experimental Session.*
At the beginning of each session, I will briefly explain what you are required to do at each stage. Left-click to continue.

3^{rd} **Instruction:**
The distance from the monitor to your eyes is very important during the presentation.
Please put your head on the CHIN-REST in front of you. Try not to lean backward.
Left-click to continue

4^{th} **Instruction:**
(1) *CALIBRATION SESSION*
Please, wait for a few seconds while I adjust the system.
When the system is ready, I will ask you to continue.
Left-click to continue

5^{th} **Instruction:**
(1) *CALIBRATION SESSION*
You're now going to see a series of small black SQUARES on the screen.
At each screen, one black square will appear at a different position.
Please, keep your eyes fixated on each of these squares.
Left-click to continue

6^{th} **Instruction:**
(1) *CALIBRATION SESSION Thank you! The calibration is now complete.*
Left-click to continue

7^{th} **Instruction:**
(2) *FREE VIEWING SESSION You are now going to watch a series of* 7 *videos.*
Please, watch them as if you were at home watching TV.
Whenever you are ready to start, please left-click to continue.

8^{th} **Instruction:**
(3) *TRAINING SESSION*
This study is concerned with defects or impairments in video images and their effect on human viewers.
We are not concerned with the content of the videos.
We are interested in whether or not you see any defects or impairments in the videos that we will show, and if so, how annoying defect is.
Left-click to continue

9^{th} **Instruction:**
(3) *TRAINING SESSION*

Here is how you will determine the annoyance value. I am about to show you a set of sample clips.
The sample clips include two sets of videos. The first set has 4 *high quality videos.*
Left-click to play the set of high quality videos.

10^{th} **Instruction:**
(3) *TRAINING SESSION*
The second set has degraded videos. They will give you an idea of the range of quality that you will be seeing.
You are to assign an ANNOYANCE value of 10 *to the most annoying video among the sample clips.*
Left-click to play the set of impaired videos

11^{th} **Instruction:**
(3) *TRAINING SESSION*
Did you see any defects?
Remember that the most annoying defect that you have seen is to have a value of 10.
If the annoyance value of a defect in the experiment is half of the worst sample clip, give it a 5*;*
if it is $1/10th$ *as bad, give it a* 1.
If the defect did not annoy you at all, call it zero.
Left-click to continue

12^{th} **Instruction:**
(4) *PRACTICE TRIAL SESSION*
Before we start the experiment, you will have 6 *practice trials to be sure that you understand the task.*
You will be asked to perform the exact same tasks you will perform in the main experiment.
You will respond in these trials just like you will in the main experiment.
We will not use the data from the practice trials, so don't be concerned if you make a mistake here.
If you have any questions or concerns, feel free to ask me.
Left-click to continue

13^{th} **Instruction:**
(4) *PRACTICE TRIAL SESSION*
You will be presented with one video clip on each trial.
Each clip will last 10 *seconds and will be played once.*
After the clip is played, questions will appear on the monitor.
The same questions will be asked after every trial. Do not spend a lot of time thinking about your responses.
We want to know your initial impressions.
Left-click to continue

14^{th} **Instruction:**
(4) *PRACTICE TRIAL SESSION*
You will be asked to estimate the annoyance of defects or impairments in the video.
The defects can be found in any region of video and at any time during the clip.
After the clip is played, you will be asked: Did you see any defect or impairment?
If you did not see a defect, answer NO. Then, Left-click to play the next clip.
Left-click to continue

15^{th} **Instruction:**
(4) *PRACTICE TRIAL SESSION*
For those clips in which you do detect a defect or impairment, answer YES.
You will be then asked to indicate the annoyance of the defect you saw using a scale with values ranging from 0 *and* 10.
You are to assign an annoyance value of 10 *to the most annoying video.*

If the annoyance value of a defect in the experiment is half of the worst sample clip, give it a 5*; if it is* $1/10$*th as bad, give it a* 1*.*
If the defect did not annoy you at all, call it zero.
You should enter the scores using the mouse to LEFT-click on the desired value.
Left-click to continue

16^{th} **Instruction:**
(4) *PRACTICE TRIAL SESSION*
After you finished entering your choice of number, Left-click to play the next video.
Do you have any questions?
Left-click to start PRACTICE TRIALS.

17^{th} **Instruction:**
Did you perceive any impairments or defects in the video?

18^{th} **Instruction:**
(5) *MAIN EXPERIMENT SESSION*
The experiment is divided in 2 *parts. Each part should last approximately* 25 *minutes.*
A break will be given after the first part of the experiment is finished.
If you need to take a small break at any time, enter your answers for the most recent video, but wait to Left-click until you are ready to go on.
You should stop if you are confused about what to do.
If you realize you have entered data incorrectly, tell me and I will go back and fix it later.
Left-click to continue

19^{th} **Instruction:**
(5) *MAIN EXPERIMENT SESSION – PART I*
Do you have any questions?
Left-click to start PART I

20^{th} **Instruction:**
Did you perceive any impairments or defects in the video?

21^{st} **Instruction:**
This is the end of the first part of the experiment.
Please Left-click whenever you are ready to resume the experiment.

22^{nd} **Instruction:**
(1) *CALIBRATION SESSION – PART II*
You are now going to perform the calibration session again.
Please, wait for a few seconds while the experimenter adjusts the system.
When the system is ready, the experimenter will ask you to continue.
Left-click to continue

23^{rd} **Instruction:**
(1) *CALIBRATION SESSION – PART II*
You're now going to see a series of small black SQUARES on the screen.
At each screen, one black square will appear at a different position.
Please, keep your eyes fixated on each of these squares.
Left-click to continue

24^{th} **Instruction:**
Thank you! The calibration is now complete.
Left-click to start the Part II of the experiment.
Left-click to continue

25^{th} **Instruction:**
Did you perceive any impairments or defects in the video?

26^{th} **Instruction:**
This is the end of the experiment.Thank you for participating!