# Toward Evaluating the Usefulness of Global Illumination for Novices in Lighting Design Tasks

Supplemental material – questionnaire answers translated into English

This document contains translated answers the subjects provided in the questionnaire. The answers are grouped by questions; the number before each answer is the name of the subject in the study. A missing number indicates that the subject did not provide an answer.

# Experiment 1

## 1.1 Please comment on your accuracy rating. Why were you satisfied with some results more than with others?

1 Indirect lighting-cartoon – I've run out of time when manipulating with the position. Indirect lighting-architecture – the back light could be improved, but I did not want to ruin a satisfactory solution.

2 Satisfied: images looked like the target, less satisfied: some shadow/surface had different intensity and I would ruin the rest by trying to fix it

3 Carton Indirect – I've forgotten about the light intensity. Architecture Indirect – lots of work.

4 There were good starting points in some cases – hard shadows that are easy to match.

5 I've matched the target image that it almost looked the same. But I was unable to match it with 100% accuracy.

6 Working with single light was relatively easier, and because of that the result was better.

7 Cartoon indirect – OK, biggest problem was probably getting the light size right and to pick the right intensity with mouse. Indirect architecture – hard to get both lights right, I was unable to match the shadow hardness.

8 I was aware that my result for indirect lighting is not accurate, but I was unable to improve it.

9 Because I was able to match some better and some worse... it depends on the subjective difficulty.

10 Direct lighting in Cartoon: I was unable to match the shadows shape. Indirect lighting Cartoon: I was unable to spot a difference between my and target images. Architecture scene: I had difficulty matching the overall light intensity in both trials.

11 Particular shadows matched the target image better

13 I was unable to set up indirect lighting in Architecture – I think I've switched the light positions ;). But it was easy of the Cartoon scene. I've matched Direct lighting in Architecture best, because there were lots of features to match.

14 Architecture direct lighting – because I had to watch 2 lights, and there was lot of shadows in the space.

15 It was hard to tune shadows in the Cartoon scene

16 Less: scenes where I've finished with a rig I've made worse with attempts to improve it – stronger feeling that I do not understand it.

17 I think that my result matches the target image in all trials. I could experiment more with trials rated as 4, but I think that the difference between 4 and 5 is just my subjective feeling that I could have found the solution earlier.

18 My results in the Cartoon scene were not good, probably because I am not used to round shapes (face, character, chair, ...)

19 I had difficulty with combining multiple lights and their intensities in Architecture Direct lighting. The lights' effects can be separated better in Architecture Indirect.

20 I was unable to get the shadows right for Cartoon indirect.

21 Sometimes I was able to guess the position and intensity at the beginning, and sometimes it was harder to put everything together

22 Cartoon was easier for me, hence the better result. I was not able to shade some parts of the Architecture scene according to the reference.

23 Positioning single light in "indirect lighting - architecture" was harder

24 Tasks were similarly difficult. I would rate the lighting of the "architecture" about 0.5 point better, I am more satisfied with it.

25 See below.

26    I wasn't able to find the right position of the back light in the 3$^{rd}$ task. Other tasks seemed much easier.

## 1.2 Please comment on your difficulty rating. Why do you find some trials harder and some easier?

**1**    Indirect lighting seems harder.

2    Manipulating single object is easier than manipulating multiple objects.
        Easier scenes have sharp shadows, because of them I think I was able to position the light nicely.

3    Architecture indirect – I've tried turning the light off and I was surprised with the effect.

4    Working with multiple lights is harder the first time...

5    The target image was nearly matched. I had bigger problems with light setup in the Architecture Indirect trial.

6    Generally it was simpler to work with the first space (Cartoon) and single light

7    Indirect lighting – evil :). Harder to match shadows.

8    Indirect light manipulation was harder, because the shadows were more subtle

9    I have the feeling that I cannot match indirect lighting, because I cannot determine the light position (especially with multiple light sources)

10    Architecture scene was harder to light, because it had 2 lights

11    The last task seems the hardest. Light setup in initial stage mislead me.

12    The Cartoon scene seems easier to light, because it has only 1 light. Direct lighting is easier to imagine based on the real world experience.

13    Direct lighting in Architecture was easier because of shadows, that were good indicators. Direct lighting in Cartoon was harder, because the lighting was less bright overall. Indirect lighting in Architecture was a nightmare, because there was nothing to start from.

14    It depends on light count. Find, how to set up the lights, find a shadow to use as a reference. Maybe the one with character seemed easier, because one concentrates on her and forgets the rest.

15    There were more shadow casting objects in the Cartoon scene, setting up the light was harder.

16    Two lights are more difficult than one. When I need more time to match the target image – harder (First two were equally hard and easier than last two, that were also similarly hard)

17    Direct vs. Indirect lighting does not affect task difficulty for me. I find tasks with Architecture harder, it is harder to realize, which light should be used to light a particular part of the space. Cartoon was not so hard, it is easier to realize the incoming light direction when lighting faces.

18    Architecture has clear straight shapes, but cartoon has rounded objects

19    It is harder to work with multiple lights, light position can be relatively easily guessed when working with single light (easier with direct lighting). But multiple light sources influence one another.

20    Architecture indirect lighting was relatively hard, because I had to realize for the first time, which light source creates which effect in the scene.

21    Some positions and settings of lights were harder to guess.

22    Cartoon was simple, because I had to use only single light. In architecture I had to position 2 lights to match the reference.

23    Combining more lights

24    Tasks were similarly difficult. Scene "architecture" does not contain as difficult structures for lighting.

25    Problems with spatial imagination ;)

26    Cartoon: configuring 1 light was not big problem. I missed the option to tilt the light for better result in the architectural scene

# 1.3 Please describe the workflow you have used to match the target image.

**1**      I've tried to get the light close to the right spot and then fine-tune the parameters

**2**      I've found a reference point, using which I've estimated the rough light position (I've turned off other lights), I've fine-tuned the position using straight edges lines. I've iterated this for all lights. Then I've tried to fine-tune the light intensity.

**3**      First I've set up the intensity (if it was not sufficient), then I've watched how moving the light around changes lightness of places

**4**      First I find reasonable shadow that can be easily matched, then I try to match it; increase and decrease intensity.

**5**      When trying to get close to the target image I've first utilized moving lights, then setting their intensities. I've iterated this until the task was done.

**6**      First I've set the rough intensity of light, then changed position and size according to shadows cast by objects and highlights, and finally I've fine-tuned the intensity.

**7**      First I try to get the position using shadows and then adjust the intensity. If that does not work, I begin experimenting.

**8**      1: setting light intensity, 2: light position manipulation (while watching shadows movement), 3: fine-tuning light intensity

**9**      By watching the shadows of target image and trying to get the same by correctly positioning the light. The light intensity was estimated using scene colors.

**10**      First I've set up approximate intensity, to be able to see anything. Then I've enlarged lights, to get the same shadow hardness. I've moved lights to get the same shadows shape. Finally, I've fine-tuned the intensity.

**11**      Establishing reference points (shadows in the scene) and their sharpness. First I've estimated the light direction, then fine-tuned the intensity. The intensity change did no work in the last task, so I've switched the lights with different softness.

**12**      (1) Light size change (if possible), (2) moving the light so that shadows and lit surfaces match the reference as closely as possible, (3) working with the intensity and additional light moving. Alternating between (1), (2), (3) – progressively smaller changes.

**13**      First I match the intensity of light, then move lights – according to brightness levels in different portions of the image, finally fine-tuning the intensity.

**14**      I had to find the key light reflection and key shadow (for myself)

**15**      First I've set up light position, then the size if necessary, and finally the brightness

**16**      First: try to estimate where the light shines from. Then: add intensity to better match target. Then: moving (and rotating) lights so that shadows match.

**17**      I've estimated the xyz coordinates of light source (according to shadows cast in the target image). Then I've changed light intensity and fine-tuned the light source position to match shadows and their intensities (or depth) with the target image.

**18**      I've increased light intensity in the scene and then moved lights to get the same shadow as in the target image. Finally I've fine-tuned the intensity

**19**      Try to estimate the light position using shadows and intensity using entire scene brightness. When using more lights try to estimate the position also using highlights, try to separate effects of different lights on the scene (if possible).

**20**      1: add intensity to better compare result with target image, 2: find permitted operations, 3: find shadows and most bright surfaces, 4: determine source position, try to match them (by light manipulation) (positioning light against the most bright surfaces, on the other side of objects' shadows), 4.5: in case of 2 sources compare both positioning variants, 5: slight changes of intensity and most visible details of shadows and bright surfaces (by moving light)

**21**      1: guess the light intensity, 2: according to shadows guess a possible position of light, 3: move the light to the guessed place – to match shadows, 4: fine-tune the intensity

**22**      I resized the light, increased intensity, and then moved it. Additionally I've worked with intensity and size.

23      1: Choosing the right intensity of the light (and guessing the size), 2: Moving light to match shadows, 3: fine-tuning the intensity
24      First I've set the intensity of the light, then moved it. I've also corrected the intensity at the end.
25      Trial-and-error, try to picture the scene in reality. Later applying learned steps.
26      First I found rough position of the light, then tweaked it to match the shadows, finally I adjusted the intensity by experimenting and tried to move the position.

## 1.4 Did your workflow differ when using indirect lighting (compared to direct lighting)? Please describe how.

**1**      No
2      Not much, only that it was harder to match soft shadow
3      I've used light intensity much more with indirect lighting
4      It did not, I could not see the difference in tasks
5      Workflow did not significantly differ. Only in the Architecture direct lighting experiment I had more problems with setting up lights and their intensities.
6      No
7      First I move light to all scene corners to see the effect it creates, then I try to guess what is closer to the target
8      I used subjective feelings and trial-and-error more when manipulating with indirect lighting. Setting up direct lighting was a mechanical routine
9      I think not
10      I did not see any difference
11      I did not observe any major difference in workflow. Maybe only that in the Cartoon scene I've noticed the distinctively lit face and adjusted my workflow because of that – more emphasis on the intensity choice.
12      More emphasis on the light intensity than movement
13      No
14      It seemed that there were no differences
15      No. Indirect lighting was better suited for the Cartoon scene, direct lighting was better for the second scene.
16      No
17      I think not, I only had to realize, that the light behaves „differently" when using indirect lighting. In my opinion it does not influence difficulty.
18      No
19      Not much. It instead differed because of light count.
20      I don't think so, I've used the concrete experience with moving a light source, I did not use the knowledge that it is direct or indirect lighting . To be able to use this information to alter the workflow I would need better imagination. I did, however, notice the difference in rendering.
21      Workflow is the same – only when using direct lighting it was easier to estimate the light position from shadows.
22      Yes. I've changed size and intensity more for direct lighting.
23      The result of indirect lighting was not as much dependent on the position.
24      I don't think that the workflow differed, I worked intuitively.
25      It almost didn't differ, one can see that the light works differently, but I as a layman almost cannot tell the difference. It's clearer after seeing multiple references.
26      The workflow did not differ for Cartoon tasks. It was similar – find roughly matching shadow and then fine-tune the details. In architectural scene I observed how the lights interact, and it was more trial-and-error. I did not observe significant difference between direct and indirect lighting.

# 1.5 Which specific image features were you trying to match? Did the visibility of these features differ in some trials? Was it dependent on the use of direct/indirect lighting? Please describe how.

**1**      Light intensity on different places and shadows, or highlights (chair in the Cartoon scene)

2      Mainly shadows, because they depend on light placement. Then I've fine-tuned intensities.

3      I've tried to put shadows where they are supposed to be. When that was true, i liked it :-)

4      Distinct shadows, if there were none then the most distinct whose visibility was dependent in the Cartoon scene, in the Architecture scene it depended on light position

5      In all target matching trials trials I've focused on correct  setup of shadows cast by lights.

6      Mainly shadows and highlights. I think, that shadows and their visibility was dependent on direct/indirect lighting. They were more prominent for the indirect lighting and when using 2 lights (architecture) the effect were added together.

7      Light intensity in the scene, shadows. Those were the most visible features, after that highlights.

8      1. shadows, 2. light intensity on particular surface, 3. highlights (when some formed, I had to eliminate it). Shadows and light intensity on particular surface were more visible in the case of direct lighting. In the case of indirect lighting it was much harder to set up the parameters (shadows, intensity of light on particular surface).

9      Shadow of character, lamp, pillar, and staircase. I don't think that the visibility of my selected features differed. One cannot rely on shadows when using indirect lighting.

10      Main clue was the shadows. I have not registered any crucial difference in visibility. Another clue were burned (or very bright) surfaces in the target image

11      In the cartoon scene I've used the laundry basket and intensive lighting of the face (in case of direct lighting). In the Architecture scene I've focused on the burned part of „staircase" and on sharp shadows. There was also a shadow near the ceiling in the corner of Cartoon scene.

12      Shadows. Particular lit surfaces. Cartoon – it is clear what needs to be adjusted on the face (shadows) to better match the reference, indirect lighting: worse visibility.

13      Shadows – Most prominent in Architecture direct lighting, less in Cartoon direct lighting. For indirect lighting brighter/darker surfaces.

14      Mostly shadows and prominent bright areas. I do not think that the visibility differed, maybe for direct lighting there were less shadows, but some were there.

15      Shadows, reflections, brightness. I did not see any difference between direct and indirect lighting from user point of view.

16      Lit surfaces, direction, softness, shape of shadows. For direct lighting Cartoon the brightly lit surfaces were more visible. I do not remember more.

17      1) Strongest light and most deep shadows 2) direction of shadow and how fast is the transition between dark and light – For direct lighting the strongly lit and not lit surfaces are of course better visible, but for indirect lighting it is quite easy to deduce, where is the light source

18      Direct and tune the softness of shadows according to the target image

19      Mostly shadows. Then the overall brightness, highlights. The shadows are sharper when using direct lighting

20      Shadows and overexposed points, intensity on bigger surfaces (see 1.3). Theoretically surely yes, but it does not affect task completion (see 1.4)

21      Roughness of shadows – objects; Intensity of lighting – entire scene; Cast shadow position; Lighting of different objects. All that was easier distinguishable for direct lighting.

22      Face of the character, lamp. Architecture: column and its shadow, wall. Yes, it differed. Yes, the lighting had to be set up well to correctly cast shadow for direct lighting.

23      Shadows cast by columns, distinct facial features. The features were lit less uniformly when using direct lighting.

24      Wanting to match shadows – I don't think that the visibility significantly differed in the tasks. Wanting to match intensity of the light in brightest point – easier to see in Cartoon scenes.

Visibility was dependent on direct/indirect light use.

25      Importance of shadows/visibly lit surfaces
26      Particular sharp shadows of objects in background. Visibility did not differ much.

# Experiment 2

## 2.1 Please comment on your accuracy rating. Why were you satisfied with some results more than with others?

2        Subjective feeling how are the images close

3        I was unable to deal with the shadows in Architecture indirect

5        I had problem in the Architecture indirect trial with lighting the part of the image in the back. Because of that the matching was not very good.

6        I was never satisfied with shadows distribution in corners of the Architecture scene.

7        Harder than EXP1, it is harder to correctly mix it without large shadows, especially in Architecture scene, where the two lights interact with each other a lot

8        Same as previous expt.

9        Because... something went well and something not.

10       Here I was satisfied equally, because without the shadows it was very hard to compare the image with target.

11       In scenes where I was not satisfied were the soft shadows off. I was not sure that they match the reference.

13       I was unable to find what I had wrong in Indirect Cartoon scene

14       Same as ex. 2 → more lights is worse

15       I was able to light the Cartoon scene faster, on first, second try.

16       When less: some surfaces had different darkness than reference image.

17       It was hard to find balance between intensity and precise position of light for direct lighting so the „roof" has right shadow

18       In some target images it was clearer where is the light coming from.

20       (Indirect Architecture) I was unable to handle the light near the ceiling in the farther end of the the room. I was barely able to find a difference  between start and target images for both direct lighting images, working with indirect lighting is clearly beyond my skills.

21       See experiment 1

22       Scene "Cartoon Indirect lighting" was easier to shade than "direct". In "Architecture Indirect lighting" it was harder to work with lighting than with "Direct lighting", therefore worse result.

23       Reflections were not entirely accurate (walls, ceiling)

24       I was unable to precisely set the angle and intensity of light in right corner of the "architecture"

25       Worse spatial orientation in Architecture, than in Cartoon

26       Setting up 1 light is not big problem, 2 lights are much more complicated. When I finally was satisfied with 1 light, the second side of the room did not match (task 3). I was able to match other tasks well

## 2.2 Please comment on your difficulty rating. Why do you find some trials harder and some easier?

1        Architecture is more difficulty, because it has 2 lights

2        Less easy: It was harder to find something affected by position of single light. And it took mi longer to match the scene.

3        Difficulty increases with number of lights and indirect lighting.

4        Somewhere I had luck and succeeded on first try, elsewhere I needed more experimenting. Somewhere (1) were missing any easily reproducible shadows.

5        I have noted bigger problems with matching the target image in Architecture environment. I think it is because it is less colorful.

6        It was nearly impossible for me to get satisfactory shadows setup and light intensities in the Architecture Indirect trial.

7       same as before
8       Same as previous experiment.
9       Because I am probably not able to light a scene with double indirect lighting...
10      It was much easier to light the „Cartoon" scene, because it had smooth surfaces
11      It took me longer to find ideal light positions in Architecture scene, because of that I consider it more difficult. The light function is more obvious here, and it takes longer to match the target.
12      Indirect lighting-architecture – initial position of one light was not much different from the final position
13      There are too few reference points in Cartoon indirect trial. It is easier to track lights in the more complicated scene.
14      The less shadows it casts, the worse it is for orientation. Of course it grows with light count increase.
15      The manipulation with single light in the first scene was easier, it did not require as much fine-tuning.
16      Hardest: I did not know, how to brighten some surface. Indirect lighting Architecture: I did not know where to put lights.
17      Fill light and face lighting indirectly was the most hardest part, it was hard to imagine the light source. I did not see a difference in the „Architecture" scene
18      For the same reasons as the previous comment.
19      Similar to exp. 1. Cartoon was harder, because there were not as much shadows to guide me.
20      Most importantly the lighting with two sources without key lights was hard to reproduce, I missed the shadows a lot.
21      See experiment 1. + Here it was harder to set light size + movement in multiple directions
22      Working with 2 lights in architecture was more time intensive, but it shaded the scene better. I focused on the character in Cartoon, but then the lighting of the lamp did not match.
23      Again the need to position 2 lights. Fine-tuning the lighting on two sides of column was harder.
24      Scenes "architecture" were harder – I was not able to match lighting of corners and columns well with fill lights.
25      See above.
26      1 and 2: No problem encountered. 4: It took me a while to  set 1 of the lights, but I hope I did it well in the end. Task 3: here it was hard to set up both lights. Both position and intensity.


## 2.3 Please describe the workflow you have used to match the target image.

1       Same as experiment 1
2       I found significantly brighter part where to put the light and using dimmer ares I've fine-tuned the intensity.
3       Same as before + I was thinking about the intensity from the beginning.
4       I've found the sharpest shadow and tried to match it, then eventually other small shadows.
5       First I've manipulated with single light, changed size and intensity of emission, then I've worked with the second light. Then I've combined lights and procedures.
6       First I've estimated the intensity, next I've manipulated with the light (lights) and changed the size according to shadows and highlights distribution on different objects (lamp, columns). Finally I've fine-tuned the intensity
7       Same as EXP1, but I've tried to view the scene as a whole to avoid situation where I tune the intensity of one shadows, but other shadow is completely off, or present when it should not be, etc.
8       See previous exp.
9       I've located the darkest spots and worked according to them.
10      Cartoon scene: according to the highest intensity I've determined rough position of light in

the scene. I've determined precise position and size using the shading on character face. Architecture scene: I've again determined position according to brightest spots in the scene. I've also used the setup from Experiment 1 and the fact that lights switched places between indirect and direct illumination.

11    First I've set up the translation, then chosen the intensity, and then iterated the procedure to fine-tune the result

12    (1) Intensity, (2) change of size, if possible, (3) translation – Repeating (1), (2), (3) – incrementally smaller changes.

13    Evaluating the scene – brightest and darkest parts. Rough intensity adjustment. Moving lights into the position. Fine-tuning the intensity

14    I think that the workflow was same as in ex 2. Again I had to find key shadow and reflection (for myself) and try it with trial-and-error.

15    First I've adjusted the intensity of light, then solve position, and finally size, if needed. As a last step I've fine-tuned the intensity.

16    1: light positioning (sometimes increasing intensity first), 2: fine-tuning – positioning/intensity

17    My workflow was similar to experiment 1, only for fill lights I had to pay more attention to bigger surfaces to determine where the light is coming from.

18    First I've tried to imagine where is the light coming from, adjust intensity, then move the light, if it fitted I've just fine-tuned with movement and intensity.

19    See Exp. 1. More concentration on small shadows and brightness of small parts of the scene. In Direct+Architecture the key was to determine which light goes to which part (I was not able to do it in Expt. 1)

20    Same as 1.5 except for detection and matching of shadows. I've instead focused on surface brightness. I had no other option...

21    1: setting the intensity of light, 2: guessing positioning of light – moving, 3: fine-tuning intensity, 4: setting size of light – according to shadow softness, 5: checking position, intensity, size

22    First I enlarged the lights, added brightness, and then worked with movement and also shrank/enlarged.

23    same as 1.3.

24    I used the same steps as in Experiment 1 (see answer 1.3), positioning of lights was harder this time.

25    See experiment #1

26    First: set approximate intensity or axis Z to get similar light. Then set the light position according to dark shadows. And repeat these two steps on finer scale.

## 2.4 Did your workflow differ when using indirect lighting (compared to direct lighting)? Please describe how.

1    NO

2    I had a feeling that shadows can be used better for placing lights for Indirect lighting, but I was unable to do so for direct lighting, so I've used overexposed parts instead.

3    Workflow was not very different, but shadows work differently

4    I had to experiment more with indirect because of bouncing, but it was easier to overlook some small parts, because it gets there somehow anyways.

5    In Architecture trials, especially for indirect lighting I did more often combined translation and intensity of lights

6    No

7    See 2.3, but I think I've got it sooner than EXP1

8    See previous exp.

9    I don't think so.

10    Workflow was not significantly different.

11    I haven't noticed change in workflow. Only in the last trial I've concentrated more on the

color of columns (Architecture - direct)

12      Again, bigger emphasis on lighting intensity, lower on precise position. It's not clear where to put light for Indirect lighting → workflow was more „random"

13      I've concentrated on light for indirect lighting and shadows for direct.

14      I don't think so

15      Not for the first scene, indirect lighting was more difficult in the second one, but the workflow was the same.

16      No, only for indirect lighting Architecture I was less sure when placing lights

17      I probably needed to play more with gradients of light and shadows by carefully changing the intensity, but the basic workflow was the same

18      No, still the same workflow.

19      Less orientation by shadows, more by object lightness

20      I think not. See 1.4.

21      The workflow did not differ

22      Yes, it differed. I manipulated more with light and its size for direct lighting

23      Same as before, direct lighting was more sensitive to position, indirect to intensity

24      The workflow did not differ

25      See experiment #1

26      When using direct lighting I spent more time with setting up the intensity of light. It kept bouncing off the walls. I had to try intensity more. Workflow of positioning did not differ. I tried to match shadows.

## 2.5 Which specific image features were you trying to match? Did the visibility of these features differ in some trials? Was it dependent on the use of direct/indirect lighting? Please describe how.

1      Cartoon – shadow on column, light intensity
        Architecture – brightness/darkness of the column, light intensity at the ceiling in the further part of scene

2      I've already described it before

3      Shadows. Yes. Yes. It was not sure where are all the shadows for larger amount of lights.

4      hard shadows in the face or on the column. Visibility differed, there were almost no shadows for (2), so it was hard to find anything, but I was lucky and after few trials it looked nice

5      I've again used the shadows cast by each light

6      Especially shadows and highlights on different objects. Generally it was a bit harder to find the right setup for indirect lighting (especially in Architecture)

7      Well, to catch the intensity and point-likeness of a light with no bigger clues in form of shadows is hell. I probably first look at the brightest points and guess the lighting.

8      Same as the previous exp.

9      Clothing creases on the character, color of column (especially difference on two sides). Did not differ, was not dependent.

10      In the Cartoon scene I've used shading on the cartoon face. That was not possible in the Architecture scene, because it did not have any smooth objects. So I've used brighter spots in the scene. I've noticed a slight difference between direct and indirect lighting here. With indirect lighting the brightness of some objects did not change as rapidly as for direct.

11      In the last trial I've noticed column color change. In the case of Cartoon scene I've used again the laundry basket and also doors and lamp. The differences were more obvious for direct lighting – more tweaking.

12      Shadows from a particular lit area, for example if the shadows reaches 1/2 or 1/3 of the wall... Direct lighting: differences are easier to spot

13      Cartoon: highlight on the character, Architecture: wall and ceiling illumination

14      Shadow thickness, their darkness, bright vs. dark areas. It seemed harder with direct

illumination.

15     It did not significantly differ

16     Darkness of different areas – bigger differences for direct lighting – even shadows a little

17     Main light, deepest shadow, … (see experiment 1). It is harder to find shadows for fill lights, but it can be done. Fill light with combination with indirect lighting should be harder, but the main lit areas are easier to spot for it, so I would not say that there was a difference in the difficulty of indirect lighting

19     See expt. 1. More oriented on brightness of different parts of the scene. Less shadows for indirect lighting (even smaller ones)

20     I've missed shadows, so I've tried to stick with areas brightness and overexposed spots, which was more difficult for indirect lighting. In direct lighting trials the handicap of fill lighting was easier to overcome by the information about large areas brightness.

21     See experiment 1

22     In Cartoons the shadows on the face, in architecture the color of column and its shadow. Yes, the visibility differed. Yes, color was brighter and clearer in direct lighting, sharper shadows.

23     Shadows, evident reflections of light (brighter areas on walls, etc.). Features were less different than in previous experiment. Features were lit less uniformly in Direct lighting (as before).

24     Wanting to match shadows and brightest points in image. I don't think that the visibility of features differed in the tasks.

25     See experiment 1

26     First I always tried to match light using some unlit area. They had more contrast when using direct lighting. For cartoon it was the cylinder light (shadow in left part). For architecture it was the ledge on left.

# Experiment 3

**3.1 Please comment on your accuracy rating. Why were you satisfied with some results more than with others?**

2      Subjective try, how much it looked the same

3      Maybe I am learning in time. Shadows bounces at many places.

4      I was unable to correctly light all surfaces

5      I was satisfied equally in both cases. I was however unable to get 100% correct match.

6      The Architecture scene seemed the hardest to light correctly in this experiment. Consequently I am not satisfied with the result.

7      Light 2 in the Architecture scene was not helping, I needed to balance the light on the pillar in the middle, and I was unable to do so. I was confused by the shadow behind basked in the Orion.

8      I don't know

9      I was relatively satisfied

10      I was unable to get the same shadows from column in the front of Architecture scene. Also it looked like there should be a small light in the back of the scene near the staircase, which I was unable to match.

13      In the Cartoon scene I was unable to control intensity of the light and actually not even the direction. It was easier in the Architecture (but the second light should be probably somewhere else).

14      I still think that it is about the number of lights, and maybe about too big fixation on the character.

16      I would use more time to play with it → less satisfied

17      The task in "Architecture" seemed more well-defined and I was +- sure where and how strong the light should be, character lighting seemed harder and not so well-defined, and because of that I was not sure if the solution is correct. It probably could be improved.

18      Cartoon looks harder due to shapes, and because of that the results do not look good.

19      I was less satisfied with some features brightness in the Architecture scene. I would not probably improve it in time.

21      I was unable to match indirect lighting so that the light does not bounce on objects (cartoon)

22      In both cases I was satisfied equally with the result.

23      Architecture scene: left column – railing, lighting of big column, background part of the room.

24      I was satisfied with results equally in both scenes.

25      Worse spatial orientation in Architecture, than in Cartoon

26      I didn't capture the reflection in Cartoon right on some materials. I hope I did it in Architecture though.

## 3.2 Please comment on your difficulty rating. Why do you find some trials harder and some easier?

2      Difficulty of finding a spot for determining light position

3      Indirect lighting was everywhere. Difficulty increases with multiple lights.

4      The light position in Cartoon scene could be determined through glossy slippers, in the Architecture scene was no such clue. But even the positioning when using the slipper was not easy, when combined with the amount of lighting

5      For me the matching in Architecture scene was harder. I think it was because of the color spectrum of the image.

6      I had difficulties with finding suitable directions in the Architecture scene (despite the constraints), and because of that it look longer.

7      It was dependent on small details, but in Cartoon with clear lines it is always easier.

8    I can't tell why the Architecture scene was easier.

10    There was only singe light in the Cartoon scene, and in some places was quite hard shadow, that could be used. In the Architecture scene were 2 lights, but the target image looked as it was lit with only one. That confused me. I was also bothered that I was not able to move the light in all 3 axes.

11    The sharper features of Architecture scene give clearer feedback about scene lighting. Because of that one can play with it more and it is more difficulty as a consequence.

12    I was not sure, where exactly to move the light to get the best result in the Architecture scene.

13    Generally I don't get well with indirect lighting :-)

14    Because the lights had to be close to each other, and that took mi long time to find out. Additionally It was harder to imagine, because I never knew, what will the light do, if I move it.

15    The cartoon scene had more objects casting shadows.

16    Harder: there are more moments, when I don't know what to do – I don't understand where I am, why is it doing what it is doing...

17    Probably because of perspective lessons, where we were drawing illuminated empty walls many times, so now I was practically only watching the dependency of light source intensity on the shadow depth.

18    I had to set up 2 lights in the Architecture scene, which is harder, because of their mutual effects

19    It's harder to arrange more lights.

21    Here it was harder to guess, where is the light situated, and how high + combine it with intensity.

22    Setting light position was harder in Cartoon (it took me longer), but in Architecture the brightness adjustments took me longer.

23    More difficult – more lights. Need to work with reflection. The space to light in Architecture is bigger.

24    Scene "architecture" was harder to light, working with two indirect lights was a bit of problem.

25    See above.

26    Architecture in this experiment seemed easier, because (unlike other tasks) it was easy to assign lights to space. Cartoon was harder because of light bouncing.

## 3.3 Please describe the workflow you have used to match the target image.

1    Same as experiment 1

2    I've tried to find a significantly brighter part and determine the rough light position.

3    I've tried to match the shadows

4    In the beginning by random and then by suitable improvements and identifying key bright surfaces

5    First I've rotated the scene so I could see both lights well, then I've moved lights and changed their intensity.

6    Still the same as previous experiments: 1: pick suitable intensity, 2: Discover suitable placement through light tracking, 3: fine-tune the intensity.

7    Still the same :-)

8    The workflow was much more trial-and-error and subjective opinion based. It payed off to set a parameter as precisely as possible and then leave it be and adjust another. When I did not do that, the image diverged and I was not able to get closer to the target. Generally, the longer I've played with the parameters, the worse was the result.

9    I've focused on the shadows and tried to reproduce the scene using their direction.

10    Cartoon scene. I've established the approximate position of the light using the brightest place, and then more precise position using shadow on the doors and shadow on the lamp from the

chair. Architecture scene: first I have discovered that both lights should be in the foreground. Ceiling light looked useless, so I've turned it off and set the other light using the shadow of pillar and railing.

11      By roughly positioning the lights to get approximate scene. Before that I thought about the light positions.

12      Using both intensity and movement of lights. First with less than desired intensity for better visibility and higher than necessary intensity for better visibility of illuminated surfaces – also in previous experiments.

13      More or less experimentally – I've tried to set up the position using lighter ares in the target images and then adjust the intensity.

14      Pure trial-and-error. According to "tips" I've tried putting the light someplace totally off, which I would not do on my own. For the first time I've found the lighting movement too constrained. I would need to go with them further.

15      Set the brightness, locate light, eventually change the size

16      1: try, what effect the light produces in extreme positions. 2: roughly positioning both lights. 3: fine-tune intensity and position, moving it around, experimentation and using undo.

17      For the character I first tried to remove shadows cast by pictures on the wall and lamp, also I've changed the intensity of the light to match the reference.

18      Same as previous trials – imagine where is probably the light, intensity, movement, fine-tuning intensity and small movement.

19      Similar to Exp 1,2; Bigger emphasis on reflections. The right position needs to be tried, its harder to predict.

20      In contrast to previous more trial-and-error in small range of possibilities. Matching was quite hard, I was careful when guessing light source position. Architecture was made more easy by not illuminating the farther part of the room.

21      1: where is the light situated + intensity, 2: trial and error – moving the light, until it resembles the reference scene, 3: tweaking intensity

22      Cartoon - first correctly place the light, to get right reflections off the wall and scene lighting. Then working with brightness. Architecture: first place lights then correctly set up brightness

23      Choosing right light intensity. Try to determine where should each light be. Tweaking light position.

24      My workflow was similar as in previous experiments. In the "architecture" scene I more or less used the trial and error method.

25      See experiment #1.

26      I've been setting up mostly the intensity of the light, when it was sufficient, I've changed the position and then intensity again

## 3.4 Did your workflow differ in this experiment from the workflow in previous experiments (key lights, fill lights)? Please describe how.

1      No

2      Shadows could not be used at all, workflow based only on object lighting intensities

3      I cannot describe it precisely, but yes. Because of experience. I was able to faster determine what is a dead-end.

4      I searched primarily for bright areas, not shadows

5      The workflow is still the same

6      No

7      Estimating where and how the source shines was hard. It was trial-and-error in Architecture

8      Workflow was not different, and that was a problem, because it could not be applied in the task. I played more with moving the light and explored the effects, but even then I was unable to set the light to match the target image.

9      I don't have such feeling.

10     It was not significantly different.

11     I would say that it is more complicated. And it seemed that I have to think "backwards". If I need more details somewhere, I cannot directly place a light there

12     The workflow was more random, I did not know how to exactly work with the light

13     I did not used shadows as much. Bigger emphasis on details

14     Yes, see 3.3. Purposely placing somewhere else. But otherwise again using shadows.

15     I was working the same way

16     I don't recall (except that I tried extreme positions at the beginning of the experiment)

17     See 3.5, basic steps of workflow stayed the same

18     No

19     Bounce lights are sensitive even to small movement → more experimentation and trying different positions

20     See 3.3

21     It was easier to guess the light positioning+intensity in previous experiments. Here it was more trial/error and it took longer.

22     Yes. I had to correctly set up the light, difference is that the size could not be changed. I worked with the brightness less in the previous experiments.

23     I had to think more about the light position and intensity (where it will bounce).

24     I worked in random manner, trying lights effects.

25     It did not differ

26     The workflow did not differ.


## 3.5 Which specific image features were you trying to match? Did the visibility of these features differ in some trials?

2     Highlight near the source. First trial one light, second trial difficult to tell, which highlight is from which light.

3     Shadows. Yes. I was not successful in the the last one.

4     Sharp reflections on slippers, reflections on railing. It was easy to see on slippers, not in Architecture

5     Again I tried to match shadows from the target image

6     Again especially shadows and highlights

7     In cartoon the shadows between legs and behind the basked, also trying to keep clean face. In Architecture the pillar and sharpness of the shadow under the floor on left. Hard. Intensity and direction of shadow OK, but "sharpness of its edges" and keeping the pillar lit - hard

8     See exp. 1 – yes, it did.

9     Pillar – its color was almost the same from both sides. Shadows of character and laundry basket. Did not differ.

10     The main feature were the shadows. In the Cartoon scene they were sharper and therefore could be used better for orientation

11     In the Architecture trial key was the glossiness of columns and fidelity of colors. In the Cartoon trial I focused on the absence of shadows in the scene.

12     Again, position, size of shadows and lit surfaces

13     In Cartoon the shadow in the corner of doors. In Architecture the "reflection" of light in metal parts

14     Again only thickness and width of shadows and their darkness

16     Luminosity of surfaces, shadows

17     Specific, see experiment 1. It was harder to find shadows for the character. In the room I've seen the shadows and lights better because of clearly oriented surfaces and because of multiple light sources.

18     I've tried to match light position, brightness (darkness) of surfaces, cast shadows

19     Reflections, shadows (differentiating shadows of different level). Did not differ much.

20      Too bright points and brightness of large surfaces (I cannot recall that I would use shadows)

21      The amount of light reflected on objects (Cartoon). Architecture – particular shadows on walls, intensity of different object lighting.

22      Cartoon – face of the character, shadows of the character and furniture. Architecture – column and its shadow. Lighting of back wall.

23      Shadows (cast for example by chair, column); intensity of wall lighting. The features in second scene were more similar (not so distinctive shapes and colors)

24      Similarly to previous experiments, observing shadows and brightest points in the scene. Shadows were more prominent in the "architecture" scene.

25      Distribution of shadows and brightly lit areas.

26      I tried to match lights so the scene would not contain white "burned" areas in images. In cartoon I kept eye on basket, column, and face. In arch walls, mainly the column.

# Experiment 4

## 4.1 Please comment on your satisfaction rating. Why were you more satisfied with result of some experiments?

1  In some scenes, it was hard to mimic the atmosphere

2  Depending on how well I managed to create a scene evoking a similar kind of lighting.

3  A personal feeling about what is lit and how important it is.

4  It all depended on picking the color, I couldn't always match it completely accurately.

5  For me, it was harder to choose the correct angle in indirect lighting cases.

6  In most cases, it was a lot harder to correctly light the Architecture scene than the Cartoon scene according to the target mood. I usually had to use more lights with a less accomplished result.

7  Typically, I used point lights and where large lights or gradients were necessary, I got around without indirect light. Head shots – no problem, light under the stairs – very hard. Only to do wall reflections...

9  Sometimes, I wasn't able to interpret the image mood the way I needed.

10  Cartoon: here I was fairly happy. I had something to hold on to, I was only sometimes distracted by the room's background. Direct with small Architecture: I missed soft shadows. Direct with large: here I though the target image to be strongly post-produced. It was black and white and too bright. This couldn't be accomplished. Indirect Architecture: Here there was something to hold on to. Strong light cones gave the scene its atmosphere.

13  With some of the tasks, I thought target images that couldn't be reproduced were chosen on purpose :-). In some of the trials, I wasn't able to set the light's "sharpness" the way I would have wanted. I missed indirect lighting in the last Architecture scene (large direct lights).

14  Maybe it was because of what was on the photograph. Sometimes, it is simply more similar.

15  I had trouble fine-tuning light colors, which are crucial for the result image's atmosphere. The relation between the target and working image practically didn't exist.

16  Not so much: when the resulting image didn't even come close to the target and even less, when I didn't like it.

17  probably because the feature that I would think was handy  for the given lighting was disabled and therefore depending on whether it could be replaced.

18  Trying to match the Cartoon target image where there are various light types was too hard and I therefore am not satisfied with the result.

19  Direct with large Architecture: I missed reflected light for expressing the given atmosphere.

20  A small scene with only a few sources was easier to capture, I don't have skills and experience for a larger one

21  Somewhere it was difficult to get the scene character and use it on entirely different model (especially for Cartoon, where the character was very different).

22  In some scenes, especially indirect lighting, I was unable to achieve similarity.

23  I was unable to light the scene accordingly (different positioning of objects, …). I was unable to capture color atmosphere. I was unable to highlight all prominent lighting.

24  I was least satisfied in tasks with direct lighting and big lights, I was unable to light details.

26  The effect I wanted to do was best provided by big key lights. Solution to other tasks was harder. I was satisfied with results that were easy to achieve.


## 4.2 Please comment on your difficulty rating. Why do you find some experiments harder and some easier?

2  Due to the difference between the target/result images, it was sometimes difficult to achieve3 a similar lighting feelings.

3       Definitely. Mostly the number of lights. But I had the feeling that in most cases, it was rather obvious where to put the key lights and where to put the fill lights.

4       it depended on the size/ruggedness of the scene, and on the give photograph, on how to approach it.

5       The choice of a correct choice of light orientation was the most difficult in cases where I ranked No. 2. The target image didn't match the working image. In the tasks, there were, compared to the target image, additional pillars or other objects that cast different shadows.

6       In general, it was easier to work with indirect lighting, because it offered more space for achieving the given mood

7       see above

8       In some cases, the atmosphere could be expressed by a single action (light, for example direct lighting with large lights (Cartoon)), elsewhere, more actions (color, intensity, direction), lights were required

9       Capturing the different atmosphere proved to be harder, especially when the light sources in the target image couldn't be seen.

10      I rate depending whether there was something to hold on to in the given cases. In the Cartoon scene, I almost only concentrated in the character. In the Architecture scene, there was no distinctive detail that could be imitated.

11      With some of the trials I wasn't able to achieve the shadows I wanted to achieve – hard shadows, which I was unable to soften, prevailed. Especially in the Architecture scene.

12      (Direct with small Architecture) Difficult to create the illusion that the space in destroyed

13      Due to the target images – in some cases, I wasn't able to estimate what combination of lights to use.

14      In my opinion, the result was sometime good, but it was a lot harder to get it, it was too much of trial-and-error. Especially with indirect lighting.

15      All trials were very difficult

16      Rather difficult – i.e. when I wasn't at all sure how to get close to the target image

17      Due to the difficulty of replacing disabled lighting features. Direct lighting with small light in the Cartoon scene: a maximum size of key lights would be appropriate, but could again be worked around.

18      To me, getting close to the Architecture lighting seemed easier than in the Cartoon scene

19      Sometimes it was difficult to transfer the atmosphere into the scene. In the target photograph, factors I cannot influence plays an important role –  being restricted by room walls, square lights only, ….

20      Architecture: time demanding due to its size. Indirect lighting Cartoon: the supernatural red light, I couldn't reproduce

21      In Architecture the difficult factor was the size of the space and possibilities of light configuration and usage, so its gradual setting was harder.

22      Small lights were better and easier to work with.

23      Small lights were worse when creating ambient lighting (global atmosphere). Small lights were sharper – cast more shadows. Positioning of small lights in the Architecture scene was hard.

24      Tasks were not hard, only "indirect lighting – architecture" was difficult to light.

26      I consider direct lighting with small lights the most difficult, because I had to combine lights to get the shadows.

## 4.3 Please comment on your restrictiveness rating. Why did you feel more restricted in some experiments?

2       I felt the need to use a feature that was disabled, in some scene orientations, the rotation trackball showed behavior opposite to what I would have wanted, but that's probably the only way

3       In one case, I had the feeling that being able the change the size of the key light would make my work easier. In some other cases, I wasn't really sure which lighting setup would work the best.

4       sometimes, it would probably be possible to experiment a little more, and it's probable that

the result would be better

5         In cases with small lights, I missed the ability to sufficiently enlarge the lights

6         The most restricting thing was using direct lighting and small lights, because that made it difficult for me to find appropriate angles and eliminate hard shadows.

7         Direct with small – Cartoon: gradient on in shadows were compensated by several fill lights. Direct with large – Cartoon: I missed reflection off the walls. Indirect – cartoon: no problem, only a key light on the head and fine-tune the rest. Direct with small – architecture: the size was again compensated by quantity, but not so well. Indirect architecture: swell, point light sources are easy to do.

8         I didn't feel restricted in any way

9         I didn't even once feel restricted by the tools.

10        Direct with small Cartoon: the impossibility to have a light which shines in all direction. Direct/indirect cartoon: Here I would have liked to be able to control the light's range, i.e. how fast the intensity decreases with distance from source. Direct with small Architecture: Absence of soft shadows, All Architecture: Impossibility to have a rectangular light instead of a square one.

11        I missed to possibility to create fine shadows. In the Architecture scene, there were only hard shadows, whereas in the target image, the shadows were gradual – the Architecture scene trial with small lights

12        Cartoon/Architecture direct small: unable to create softer shadows, Indirect Cartoon: absence of direct lighting

13        In some scenes, it seemed to me that indirect lighting is missing (direct lighting with large lights in both scenes). With direct lighting with small light in the Cartoon scene, the small light seemed to sharp.

14        (Direct lighting with small lights) In the first trial, it was hard to get used to the way things work (and a hard target photograph). Further restrictions were probably a consequence of the light not "being shiny" enough. As if I had to increase the intensity a little.

15        I usually haven't felt restricted in a strong way

16        I felt restricted when the light couldn't be enlarged.

17        I was surprised how hard it is to replace a large key light. Direct with small Cartoon: if the key lights could be enlarge, the lighting atmosphere could be fine-tuned better. Direct with large Cartoon: indirect lighting would be handy, but could be replaced. Indirect cartoon: indirect lighting is especially well suited for this problem. Direct with large Architecture: indirect lighting is almost indispensable, many more light would have to be used here if indirect lighting was to be disabled.

18        It was difficult to transfer the atmosphere using small windows only.

19        In general, I felt constrained by the room's walls. Direct with small Cartoon: I missed larger lights. Direct with large Architecture: I missed indirect lighting.

20        Maybe that some of the restrictions on e.g. the size or the intensity especially showed in large spaces of the Architecture scene.

21        The spectrum of lighting tools was broad and diverse. I did not feel constricted. On the contrary, the less one has on his disposal, the easier is the scene lighting (Exp. 1, 2, 3).

22        In some tasks the size could not be changed.

23        More difficult workflow with small lights (see previous answer). Otherwise no constrictions.

24        I did not feel constricted, only in some tasks, by the light size.

26        Because I had to make workarounds of solutions I would create other way.


## 4.4 Please describe the workflow you have used to transfer the lighting from the target image.

1         I tried to set the "overall brightness" and to then fine-tune additional lights.

2         Since only light was used, I've tried looking for specific lighting types on objects (lit half of face, overexposed "something" in the background/wall lighting/floor with a small source)

3         I focused on objects that I thought were important and the lighting in their neighborhood. An on lights, of course.

4       First, I tried to match the right colors, then I positioned enough lights to make it look okay.

5       I changed to camera position so as to give me the best view of all the lights. After choosing the light, I first set it to a higher intensity and its cone on as small an area as possible and then played around with the settings.

6       In the Cartoon scene, I focused on the angle under which the face is lit and at a light sufficient to appropriately light the background (e.g. deep shadows). In the Architecture scene, I paid attention to the shadow interplay. In both cases, I also concentrated on the light color.

7       If there was a distinct point light, I did it first. Then other point lights with a smaller direction setting for secondary shadows, the rest for fine-tuning. Finally, the color setting and the composition.

8       1: finding where the light source is (intensity, direction, color), 2: translating, rotating, etc. until the target mood is achieved., 3: fill lights for regulating the overall lighting in the room.

9       First, I tried reproducing the evident light sources (candle, lamp, …) using key lights. Then I used fill lights to fine tune the overall atmosphere.

10      The Cartoon scene was easy. I found out what light is positioned in the front, in the back, etc. and emulated those lights. In the Architecture scene, I first added all the distinctive lights and then fine-tuned the intensity and color of the fill light.

11      1: Position light sources, 2: fine-tune the color, 3: set the intensity.

12      Adding of new lights in corresponding colors. Large colored light in the target image

13      I kept an eye on the target image and tried to find the light "sources". I placed the appropriate number of lights (key). I set the color and intensity. And added fill lights.

14      I've tried to find the light source (what was really helpful was when there were some fires, candles, lamps on the photograph)... Then I positioned key lights
where I expected the light source to be. When I thought the light to bee to weak, I added more intensity using non-key lights.

15      Light placement, size and intensity, direction, add another light

16      First: setting the most distinctive light: 1. direction 2: intensity & color & direction. Then other lights. Then trying to turn on and off the individual lights – sometimes switching between key/fill lights. Adding lights, adjusting.

17      Since we were supposed to transfer atmosphere, the color, in addition to the intensity, was important. Therefore, I first tried different light intensities that color-match the target. Then I started adjusting the direction and most the appropriate light setting. Most of the time, an alternative solution had to be found – the most advantageous light features were in most cases disabled.

18      I tried placing various lights and colors as I thought appropriate for mimicking the atmosphere. Some distinctive details, such as the highlight on the head or point lights, I tried to keep,  the rest I tried adjusting based on gut feeling.

19      I tried reproducing typical light feature form the target photograph, especially the color, direction. The placement of lights was chosen taking the scene and the fine-tuning of the particular atmosphere into account.

20      I tried locating various light sources (when I located on, I went after the light that probably wasn't due to the light I had just found, etc.). Using the color, intensity, number, … of light sources, or eventually by bringing out some of the objects, I tried to imitate the color, intensity, number, … in the target. Gradually, I was able to better assess what isn't even possible and what I can manage in the given time limit.

21      1. guess: in what way is the scene lit – where from, intensity, color, 2: I tried to achieve it using possible lights and tools, e.g. main 2-3 lights, that created character, then I eventually used additional light to finish the atmosphere (Cartoon), 3: I observed also the lighting, shadows of different objects in the scene.

22      I was adding more lights, changing colors, moving with different lights, and if it was possible, changing size. I've also increased and decreased brightness.

23      Thinking about light position (and count). Thinking about their types. Light size. Rotation, color – capturing atmosphere. Adding more lights for fine-tuning the effect desired. Brightening up

the bright spots.

24 My workflow was more-or-less random. I added lights for lighting of details and changed their intensity and color. I tried to capture the light intensity in foreground/background.

26 Each time I tried to decide if there is a point or area light in the reference, and then select the light size to get similar shadows and angle of lighting as in reference.

## 4.5 Did your workflow differ when using indirect lighting (compared to direct lighting)? Please describe how.

2 No, it didn't.

3 Certainly. I find indirect lighting difficult and so I tried to avoid it.

4 Not really, I used a trial-and-error approach

5 the method, I think, didn't differ. I used shadows in the target to orientate myself.

6 I used more lights with indirect lighting on. Mostly direct + indirect as a softener

7 When there was a window in the scene, I put a large lamp with only a small intensity shining from the proper direction, it mostly did what I wanted it to.

8 No, it didn't.

9 I perhaps used less fill lights

10 In the architecture scene – if I had indirect lighting at my disposal, I made it the scene's main light, the one that lights the whole scenes and sets the overall color, a light that casts shadows. Without indirect lighting, I used a fill light as my main light.

11 It didn't

12 No

13 It didn't – but it was easier to work with (it was easier to set up the "light sources" the way I wanted them)

14 Yes, I had to use more non-key lights. Almost as if the scene wasn't bright enough

15 I'm not aware of it.

16 Indirect – made me thing more about how the light is going to reflect

17 To me, indirect lighting seems more natural, which means that when it was disabled, I had tried replacing it with a larger number of dimmed lights.

18 It didn't

19 I found the indirect lighting to be easier, with direct lighting, I had to replace the reflected light with fill lights.

20 Too many impressions and influences to perceive a difference, I worked on a too intuitive level to be able to tell. I probably don't have enough experience and knowledge for a more empirical approach.

21 The workflow did not differ. Every time it was more about experimentation and getting a result as close to reference as possible.

22 I used more lights in direct lighting tasks.

23 I was more focused on colors and intensities. The rotation and placement did not matter as much.

24 The workflow did not differ.

26 I tried to put the indirect light in entirely different angles to get similar effect to direct lighting. I tried to utilize the reflection.

# Experiment 5

## 5.2 Please comment on your rating/ranking according to usefulness.

1      Without indirect lighting, I had to create more lights to make the image look real. I only used fill lights fir the finishing touches on the lighting, so it's not entirely necessary, but it can come in handy.

2      With indirect light, I can create nice effects; the fill light is nonetheless very useful for lighting the rest of the scene; the key light, despite being quite flexible and allowing me to light the details of the scene comes in last.

3      It was about something different altogether. In the Still life scene, I can play around with aesthetically pleasing lighting, whereas in the Office scene, I need practical (useful) lighting.

4      The images look very flat with the fill flight, without any distinct or interesting areas, nevertheless I can sometimes make use of it. The indirect lighting is useful for tasteful/decent lighting. Key lights highlight important areas.

5      1. fill lights – in the setup, I used it as the room's main light. 2. key light – in the setup, I used it as a lamp on the desk or candle. 3. indirect lighting – in the Office scene, it isn't really important, in the Still life scene, it's unnecessary.

6      I find the fill light to be natural, omni-present. The indirect lighting causes the objects to look more real and organic. The key light casts a shadow, but only a hard one.

7      Indirect lighting brings in a higher scene realism and make it look more like containing a definition

8      For me, fill lights and indirect lighting have a similar function; for aesthetic reason, I preferred a fill light for the Still life scene and indirect lighting for the Office scene (see my other answers)

9      I find the indirect lighting effect nice and feel it can fully replace the fill light. The first place is taken by the key light, which I consider the unambiguous basis for the lighting of any scene.

10      The scene needs to be lit, meaning the key lights are indispensable. Each light produces soft shadows of a different softness – the ability to change the size of the key light would be very useful. Indirect lighting is useful, it makes the lighting look a lot more realistic. However, it can add unwanted effects when special lighting is needed.

11      Key light, as it simulates the real world – lighting fixtures, lamps, direct sunlight

12      Key light of arbitrary size: indispensable for the desired shadow shape. Fill light: when designing interior lighting, it prevents unnecessary shadows. Indirect lighting: the fact that the light fills the area in questions allows the details that are out of reach of the other lights to come through.

13      Key lights add definition (cast shadows), attracts attention. Indirect lighting adds realism to the scene (and saves work) and adds less specular highlights, which allows for higher definition + lights up the whole image. Fill lights just brightens or darkens the whole image – so it saves work a little bit, but it becomes practically useless when indirect lighting is used.

14      Key light has been indispensable in both cases, probably since talking about aesthetics in visual arts implies the presence of shadows. I found indirect lighting to be key for the Still life scene, but in the Office scene, it doesn't have to be used; the fill light, on the other hand, is only useful for large scenes and not for fine detail.

15      Without indirect lighting, the scene is always too dark. Fill lights could be used in the Still life scene to eliminate large shadows; altogether, I find the key light to be more natural and appropriate.

16      Fill lights comes in last as it doesn't cast shadows. Indirect lighting improves the result of lighting. It is caused by direct lighting → key lights are the most useful.

17      Key light casts shadows – that's why it is indispensable for both the Still life scene, whose quality rises and falls with half-shadow and sometimes also with specular highlights; I also think its important in the Office scene animation, since it is unnatural that for example the ceiling light

wouldn't cast shadows under the furniture (unless they had LED-lit floors...). That why a fill-light seems strange when used in a classical still-life setting. It can be used for open Venetian blinds in the Office scene, I think it could mimic light coming from the outside. Then, it would be necessary for such light to have indirect lighting, we are, after all, used to light reflecting off objects. Indirect lighting can, but doesn't have to, be used in the Still life scene; when indirect lighting is turned off, the image is darker and reminiscent of famous Dutch painters; it looks just as real even with indirect lighting turned on, but the overall brightness increases.

18     I used the key light almost everywhere, in Experiment 5, as well as in the previous experiments. Fill lights, I only used to lighten up the scene as it doesn't cast shadows or create highlights. I haven't made much use of indirect lighting.

19     I consider the key lights to be the most important, shadows make up a big part of the scene's impression. Indirect lighting is necessary if we want the scene to look natural. Fill lights in only necessary when fine-tuning certain details, without it, for example, a well lit-up room couldn't be created. In my opinion, all three tools are indispensable.

20     If the size constraint of the key lights isn't extreme, it doesn't impair my artistic goals. The crucial think is the ability to have a light source larger than a point light source. The ability the switch between direct/indirect and fill/key lighting illustrated interesting details within the scene and allows me to better understand what I want to achieve with my lighting.

21     The key light was sufficient for lighting both scenes. It casts sharpest shadows – for example in Still life it was more suitable than indirect lighting. I would utilize indirect lighting, if I did not have key lights. Fill lights seemed unnecessary for the scope of these tasks.

22     1. Key – used as main lighting. 2. Fill – illuminates selected parts of the scene, creates shadows.

23     Key lighting was suitable for lighting particular features (vase, cups). Indirect lighting added authenticity to the image, and also nice reflections (colors on the vase). Indirect lighting was not as useful in these situations (even though it was useful for lighting up darker parts of the Office).

24     Key lights illuminates details well and casts interesting shadows. Fill lights may be useful in other scenes, but I would probably get by without it in the scenes provided. Similarly for indirect lighting.

25     1: key light is best for creating atmosphere. 2: fill lights completes the image, atmosphere, 3: I think indirect light is not as important for creating the atmosphere, but is useful for removing shadows.

26     I would rate key lights as the most important. In my opinion they simulate the real light best. And thanks to changing its size it is possible to create both hard and soft shadows.

## 5.3 Why did you decide to use/not use <u>indirect lighting</u> in your design?

1     Because it makes light behaves as in the real life, i.e. the way I'm used to.

2     Still life – I liked the highlights. Office, I wanted to use light reflected off the ceiling.

3     Still life – aesthetic reasons. Office – for parts not necessarily important, but still useful when lit.

4     Not too aggressive when lighting the whole room. In the Still life scene, there wasn't anything to reflect the light off.

5     see question 5.2

6     I used it to make the objects appear not too solitary, to make them blend in with the environment.

7     Higher definition, objects "stand out"

8     Still life: it's looks too artificial when indirect lighting is used, Office: in the office scene, indirect lighting feels right.

9     Because I like the effects I can accomplish with it. A light placed senselessly under the table adds a warmer feel to the room (with indirect lighting turned on).

10     In the Still life scene, using indirect lighting had very little effect. When used, it just brightened some of the shadows. In the interior, I wanted to place a strong red light over the

"boss's'" table, but indirect lighting cast the whole back wall in red, which I didn't want.
11      Because it adds more realism.
12      No-Still life scene – not necessary, lightens up everything too much
13      I consider scenes lit using indirect lighting more realistic.
14      I didn't want my picture to be too dark and without indirect lighting, this would take too much time.
15      Direct lighting cast large shadows, which could perhaps be useful in the Still life scene, but which I found disturbing in the Office scene. Overall, the composition was brighter.
16      Nicely finished lighting up the whole scene.
17      I found indirect lighting to be real, that's why I used it. That doesn't mean that one needs indirect lighting in the specific case of Still-life scene – without indirect lighting, the image look like a traditional still light piece, that's why I finally turned it off.
18      I could get around with the other tools, I didn't see any significant advantage in indirect lighting when compared to the other tools
19      Do not use – worsens the impression by lighting the objects too much; for atmospheric lights. Use – for lights that should look natural; scene's main light.
20      Still life: NO. Indirect lighting spoils the shadows interplay. Office: YES. Surprisingly, there was very little direct lighting to be seen (as if a completely different algorithm than in the Still life scene had been used).
21      Because key light allowed me better what I wanted to achieve – Still life  - sharper shadows, Office – simpler lighting of the entire scene.
22      Still life – I used it, for better shading resolution and brighter image in general. Office – I didn't use it, because the scene would get unnecessarily bright, and the fill light colors would no longer stand out.
23      I used it – it added the authenticity to the image. It lighted additional objects via reflections.
24      Scene "Office" with indirect lighting would look too bright and uninteresting.
25      Using this light is dependent on the fact that I don't know how to work with it.
26      I used indirect lighting in Still life. The shading was better with it.

## 5.4 Why did you decide to use/not use <u>fill lights </u>in your design?
1       Because the complement the atmosphere.
2       To lighten up the rest of the scene, which would otherwise be in shadow.
3       See above.
4       Without fill lights, the room would be completely dark, good for a horror, but not for an office.
5       In the lighting setup, I used these lights to light up the office room.
6       Fill lights allowed me to soften the hard impression (especially present with the shadows) of the key lights.
7       In the end, they contributed nothing.
8       Still life: as it has an effect similar to indirect lighting – but feels less artificial (Still life scene isn't lit so much), Office: I could find much use for fill lights in the room, I didn't like it. I needed to light the whole room and I couldn't do that with fill lights.
9       By using several key lights and indirect lighting, the scene became bright enough and I had no need to use fill lights.
10      As I hadn't use indirect lighting, I had to add more light to the ceiling using fill lights.
11      I found their significance in the scene to be dispensable.
12      No – Still life – without shadows, it looks like coloring picture, Yes – Office – when using key lights only – shadow overlaps.
13      Saves work with key lights in the background. In the Office scene, I only used them for finishing touches, but in essence, they didn't need to be there at all.
14      In experiments earlier, I found out hot useful they are for lighting up large scenes, so I found it advantageous to use the in the Office scene. On the other hand, in the Still life scene, it bothered

me that they cast no shadows, making the objects look to artificial.

15 I used fill lights, but mainly as a supplementary measure, I always used the key lights as the main lights.

16 Only in the Office scene – to make the shape of the chairs/sofa more apparent without adding shadows.

17 I didn't use fill lights for the Still life scene, as it made the shadows disappear, everything looked too "artificial". I used the in the Office scene to make sure the room was "bright enough", while turning on the indirect lighting at the same time... However, one could managed without them.

18 I used them to add light (color) in areas shadowed by the key lights.

19 Use: handy (together with direction setting) to light certain parts, so that the rest of the design isn't affected (mostly atmospheric lights). Don't use: everywhere else.

20 Only used the to see what the scene would look like without shadows and specular highlights. Didn't used them in the final version because for me, shadows and specular highlights are somehow visually important.

21 Because the size of scenes was not as big so I would need to lighten up for example dark corners of the room (Office). In Still life I actually wanted to have darker, "intimate" atmosphere with prominent shadows.

22 The shadows would pop out, in the Office I used blue-violet color of Fill light to make the entire scene nicely colored.

23 I used fill lights to lighten places that stayed in dark after lighting using key lights (of main features).

24 I used the option of fill lights in places where I didn't want to use the shadows effect.

25 Usage for coloring of the design.

26 I used fill lights only in "Office" to simulate environment lighting from windows.

## 5.5 Did you feel restricted by the lighting tools (options) you had available during the lighting design? If so, how exactly?

1 No.

2 Sometimes, I wanted rectangular lights; other than that, no.

3 Not too much

4 The color picker was too small, it was hard to click ideally.

5 I didn't feel restricted when designing the lighting setup.

6 I didn't feel restricted. I would perhaps have liked to be able to position individual light sources (e.g. candle flame, etc.)

7 The light intensity slider was too small, okay otherwise :)

8 No.

9 No.

10 When lighting the interior, I missed a light type that could mimic the sun. That is light that would like the whole scene and at the same time cast hard shadows. I also missed a window with Venetian blinds.

11 Not in this case, but it would be nice if lighting from the bottom was allowed, one that would absorb shadows and remove the need for a direct light with a high intensity.

12 No

13 No

14 No I didn't, but I was annoyed by surrounding objects (bed sheets, Venetian blinds), which made the task harder if one wanted to put the lights behind them. Also maybe in the Office scene, it was as if I couldn't match the correct intensity for the key light (that's probably why fill lights are used) = didn't have this feeling with the Still life scene.

15 I didn't feel any restrictions.

16 Not at all

17 I think I didn't feel restricted when setting up the light in experiment number 5. What I

wanted was to create realistically looking images and that, in my opinion, was possible when using the given settings.

18    No, I didn't.

19    I would welcome the possibility of using an omni-directional light (i.e. a sphere that shines in all directions), e.g. for the candle. I could also use "hard" direction setting – a cone of light with borders cut off.  Light types different than the square light – round.

20    Quite to the contrary, I was pleasantly surprised by the tools and the setting range. The only, perhaps more unusual than restricting, feature was the absence of a bright spot that would represent the light source.

21    I did not feel constricted. The more the tools were constricted, the easier it was to match the references in experiments (not as many options). In experiments with open target (expt. 4, 5) the range of lighting tools was sufficient

22    I did not.

23    There were sometimes problems near walls with conical lights (lighting like halogen lamp). Otherwise no problems.

24    I did not feel constricted, there were many tools offered.

25    Yes. I miss better color specification (for example Photoshop "color picker"). There is no possibility to duplicate already created light.

26    I did not feel constricted.