Supplementary Material
Effects of Approximate Filtering on the Appearance of Bidirectional Texture Functions

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This is the supplementary material for the paper entitled *Effects of Approximate Filtering on the Appearance of Bidirectional Texture Functions*. This document contains:

- The detailed list of BTFs used in this work, including their resolution and size (Section A)
- The description of the pilot studies performed to categorize the BTFs used in the main experiments (Section B), to compare the multidimensional filtering against mipmapping (Section C), and to evaluate how our results generalize to multiple geometries and illuminations (Section F).
- The clustering procedure performed to reduce the number of BTFs is also included (Section D).
- Additional results on compression and rendering based on our experiments (Section H).
- The analysis that relates low-level BTF statistics with high-level visual properties (Section G).
- The full analysis of the experiments is listed (Section I).
- A sample of the stimuli used in our experiments (Section J).

APPENDIX A
DESCRIPTION OF THE USED BTFS

In this paper we use sixteen BTFs from different data-bases. This means that the BTFs have different spatio-angular resolution, and different storage requirements. Table 1 summarizes the resolution and storage requirements for each BTF. Note that the storage requirements are for uncompressed BTFs, because we want to avoid the effect of artifacts that might appear due to compression.

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- *J. Dorsey and H. Rushmeier are with Yale University.*

Name	Sp. Res.	View Res.	Light Res.	Type	Size (MB)	Source
Cambrils	72^2	151	151	Float	1352	Citröen
Carpet	192^2	90	120	Byte	1139	UCSD [1]
Ceiling	256^2	81	81	Float	4920	Bonn [2]
Corduroy	256^2	81	81	Byte	1230	Bonn [2]
Floortile	256^2	81	81	Float	4920	Bonn [2]
Impala	256^2	81	81	Byte	1230	Bonn [2]
Lego	192^2	90	120	Byte	1139	UCSD [1]
Lichen	192^2	90	120	Byte	1139	UCSD [1]
Pinktile	256^2	81	81	Float	4920	Bonn [2]
Proposte	256^2	81	81	Byte	1230	Bonn [2]
Pulli	256^2	81	81	Byte	1230	Bonn [2]
Sponge	192^2	90	120	Byte	1139	UCSD [1]
Velvet	192^2	90	120	Byte	1139	UCSD [1]
Walkway	256^2	81	81	Float	4920	Bonn [2]
Wallpaper	256^2	81	81	Byte	1230	Bonn [2]
Wool	256^2	81	81	Byte	1230	Bonn [2]

TABLE 1: Summary of the BTFs used in our experiments. A depiction of each BTF can be found in Figure 3 in the main text.

Appendix B
Categorization of the BTFs

The BTFs used in our experiments represent a wide range of materials, which makes the experiments hard to analyze globally. To obtain more meaningful data from the experiments, we categorize them into a set of high-level visual properties, by means of a pilot study. We build our set of categories from previous works on texture [3] and BRDF [4] naming. The categories used in the study, together with the textual description given to the participants, are:

- **high-contrast:** The surface presents, or no, high contrast in its features
- **granular:** Is the texture granular (i.e. it presents small micro-scale structure)?
- **structured:** Does the surface present a clear structure or is it just random?
- **rough:** Is the surface rough or smooth?
- **feature-dense:** Does the surface presents several visual features (small details) or is mainly plain (even having some isolated detail)?
- **complex-structure:** Has it a complex structure?
- **flat:** Is it flat...?
- **relief:** ...Or does it present relief?
- **sharp-relief:** If the texture presents relief, does it present sharp edges...?
- **smooth-relief:** ...Or more like smooth bumps?
- **glossy:** Does it have glossy (i.e. specular) appearance?
- **color:** Is the surface colored or gray-scale?
- **light:** Is the surface albedo light or dark?
- **soft:** Does the surface has smooth appearance?
- **hard:** Does the surface has hard appearance?

Prior to the experiment, a short explanation of each category was given to the ten participants. They were shown two static images of the same BTF, rendered on a plane from different points of view and illuminated from different directions (see Figure 1), and they had to indicate if the displayed BTF showed or not each individual property. No tiling was applied to the BTF to avoid introducing bias.

To determine whether a BTF presents a category, we cut through the data, using a conventional 75% threshold value, where 50% is pure guessing. The final assignment of categories with BTFs can be found in Table 1 in the main text. The results have a confidence interval ranging from $\pm 0\%$ to $\pm 39\%$. Note that these confidence intervals are quite big, since the number of participants in this pilot study was small.

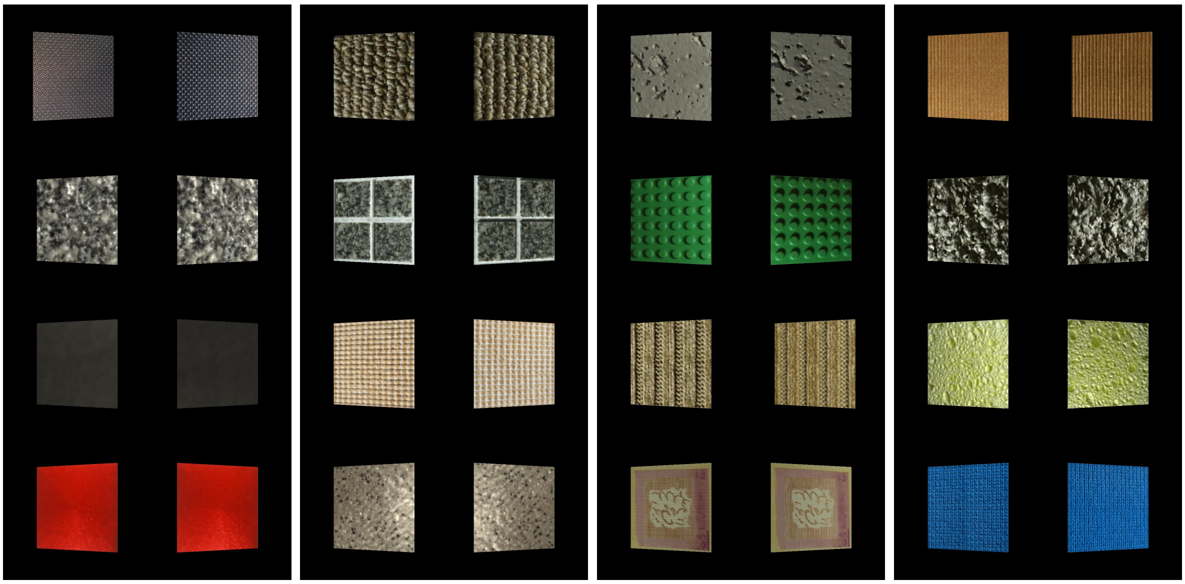


Fig. 1: Images shown to the participants of the categorization experiment, for each BTF. In reading order: *Cambrils*, *Carpet*, *Ceiling*, *Corduroy*; *Floortile*, *Impala*, *Lego*, *Lichen*; *Pinktile*, *Proposte*, *Pulli*, *Sponge*; *Velvet*, *Walkway*, *Wallpaper*, and *Wool*.

APPENDIX C
PILOT STUDY: COMPARISON AGAINST MIPMAPPING

In this pilot study we explore the differences in terms of visual equivalence when pre-filtering a BTF using classic mipmapping [5] (filtering only in the spatial domain), and using the multidimensional pre-filtering described in Section 3 of the main text.

Stimuli

The stimuli used in this pilot experiment is the result of combining the sixteen BTFs used in this work, rendered at 4 different distances d using five scales s, rendered using mipmapping or our multidimensional filtering, making a total of 640 images. The box filter is used to pre-filter the BTFs, and we limit the light direction to l_1, in order to keep the experiment tractable.

Experimental procedure

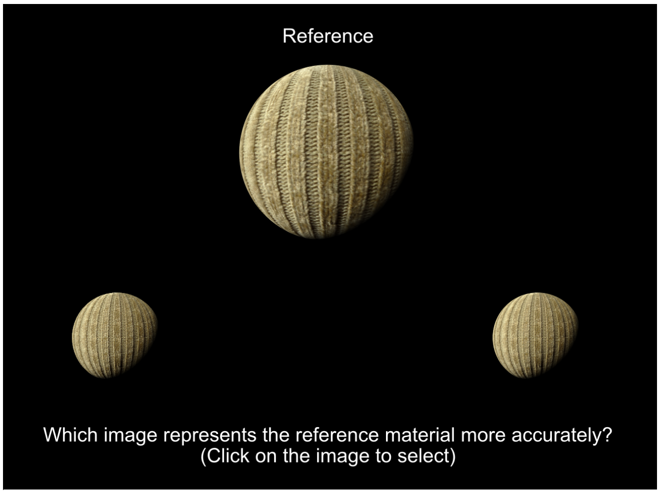


Fig. 2: Interface used in the pilot study that compares between mipmapping and the proposed multidimensional filtering.

Sixteen subjects took part in the experiment (12 male, 4 female), with ages between 23 and 32 years old. All of them had normal acuity and color vision; some of them had a computer graphics and/or artistic background. A brief explanation about the test was given orally and in writing at the beginning, although none were familiar with the final goal of the experiment. All tests were run on a LCD screen set to its factory settings, with standard office lighting. The experiment followed a fully randomized two-alternative-forced-choice (2AFC) design. There was no time limit in the experiment, which took an average of 17 minutes to complete.

For each test, three images were shown simultaneously, all of them depicting a sphere with the same BTF and lighting conditions (see Figure 2). On the top, a multi-sampled close view version of the sphere is shown as reference (rendered with super-sampling and jittered anti-aliasing to avoid artifacts); on the bottom, two test images from the stimuli set are shown. These are rendered from a more distant point of view, to avoid matching tasks in image space from the participants. One image shows the ground-truth, multi-sampled render of the BTF, while the other shows a pre-filtered representation (mipmapping or our multidimensional filtering) . The position of these two images (left or right) is randomized. The subject is asked the following question: *"Which image represents the reference material on top more accurately?"*.

Results Our analysis shows that using our multidimensional filtering performs significantly better than pre-filtering only in the spatial domain with classic mipmapping ($F = 28.8$, $p < 0.05$), with a strong interaction effect for s ($F = 165.8$, $p < 0.05$). Additionally, other interaction effects are found for several visual properties. The most interesting is the significant effect that appears in BTFs with *relief*; these are considered visually equivalent significantly more often when pre-filtered with multidimensional filtering than when using mipmapping ($F = 3.16, p < 0.05$). This suggests that for BTFs with visible self-shadows and parallax, it is necessary to filter all dimensions in the BTF; this is one of the most notable properties introduced by BTFs, as opposed to regular two-dimensional textures.

Appendix D
Clustering of BTFs

Here we describe how to select a representative subset from the sixteen original BTFs used in Part 1 from Experiment 1 (Section 5).

We first removed *Walkway*, since we found visible artifacts when rotating the light due to discontinuities in the original BTF data; this would lead to problems in Experiment 2, orthogonal to the purpose of the study. To select between the remaining fifteen BTFs, we cluster them hierachically in a binary tree. This clustering groups the BTFs according to their Euclidean distance in a 20-dimensional space, defined by the results obtained combining five distances d and four scales s in Experiment 1.

Clustering is performed using the Matlab functions *linkage* and *cluster*. Then, we take the clusters with smaller distances between their elements, and remove one of them from the selection. Figure 3 shows the result of the hierarchical clustering performed. In the end, we keep eight BTFs: *Cambrils*, *Corduroy*, *Impala*, *Proposte*, *Pulli*, *Velvet*, *Wallpaper* and *Wool*.

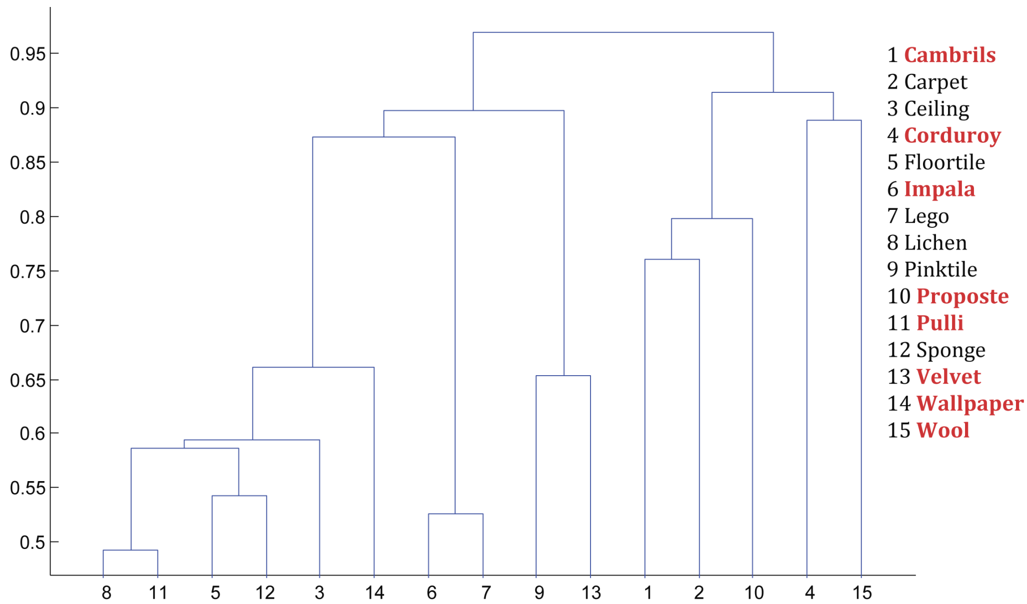


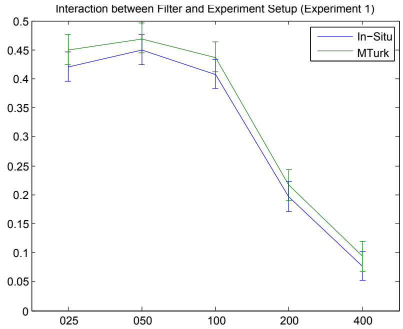
Fig. 3: Hierarchical clustering of the BTFs based on the similarity of their results in Experiment 1 (Part 1). This clustering is used to reduce the amount of BTFs in the subsequent experiments. The BTFs kept for the experiments are highlighted in red.

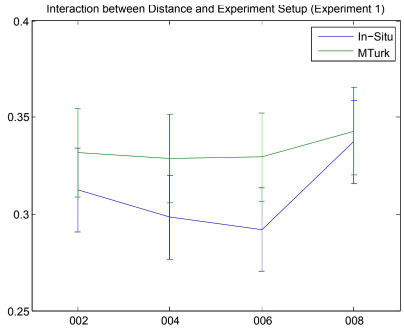
Appendix E
Comparison between controlled and un-controlled experiments

Here we evaluate the potential effect that using MTurk may have on the data; to do so, we partially repeat the experiments described in the main text, under controlled lab conditions. In particular, we repeat Part 1 from Experiment 1 (Section 5), and Experiments 2 (Section 6) and 3 (Section 7). We refer to their particular sections in the main text for the full description of these experiments and the stimuli used.

Experimental procedure A total of sixteen subjects took part in the in-situ Experiment 1 (12 male, 4 female), with ages between 23 and 32 years old. All of them had normal acuity and color vision; some of them had a computer graphics and/or artistic background. A brief explanation about the test was given orally and in writing at the beginning, although none were familiar with the final goal of the experiment. All tests were run on a 21” BENQ GL2240 LCD screen set to its factory settings, with standard office lighting. Each participant was shown the full stimuli in random order, making a total of 320 tests. It took an average of 17 minutes to complete the experiment.

Another sixteen different participants took part in the in-situ Experiments 2 and 3, equally divided between male and female, with ages between 23 and 41. The experiment was carried out under similar conditions as Experiment 1 (display, lighting, no time limit). Each participant answered all tests (64 tests in Experiment 2, 32 tests in Experiment 3), taking an average of 10 and 5 minutes to complete each experiment, respectively. **Results** We compare the results from the in-situ experiment, performed under controlled setup, with those obtained





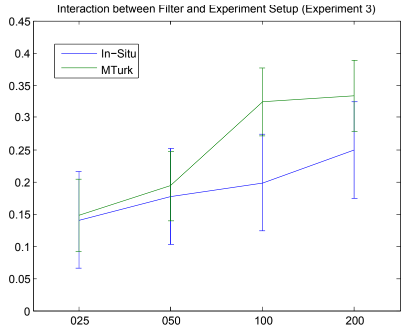


Fig. 4: Results from the comparison between the experiments performed under controlled (in-situ) and uncontrolled (MTurk) conditions. From left to right, results from Experiment 1 (static) for scale s, and for distance d, and from Experiment 3 (dynamic view) for scale s. The results show no significant differences between factors, and that the trends are consistent in both scenarios.

using MTurk. We seek significant differences between the source of the data, by using N-ways Analysis of Variance (ANOVA), focusing on both main and interaction effects with significance of 95%. Significant effects are further analyzed by using a Tukey-Kramer (or Tukey Honesty Significant Differences) post-hoc analysis [6]; this test is a modified t-test, that compares multiple means, assuming the null hypothesis that all means are equal. This test is appropriate for detecting false-positives that might be found by ANOVA, specially in multiple-factors experiments as ours.

On the static configuration studied in Experiment 1 we found a significant effect, showing a decrease in the performance of filtering for the in-situ experiments ($F = 8.76, p < 0.05$). However, the post-hoc test reveals that there is no significant differences between pairs in any of the dimensions analyzed: we found no significant differences on the results for BTF, distance d or scale s between the in-situ and the MTurk experiments (Figure 4 (left and middle)).

The results from Experiment 2, where we analyze the effect of moving light source, shown no significant effect on using MTurk in comparison with the data obtained in the controlled scenario ($F = 0.12, p > 0.72$).

Finally, the results of the comparison of the data in Experiment 3 (moving camera) shows that visual equivalence was found significantly more often in MTurk than in the in-situ experiment ($F = 7.34, p < 0.05$). Again, we analyze further the results using a post-hoc test: it shows that no significant differences between pairs appeared in the dimensions explored (Figure 4 (right)), even this main effect is found.

APPENDIX F
GENERALIZATION EXPERIMENT

We evaluate here how well our results generalize under less restrictive setups, introducing new geometries and illumination (see Figure 5).

Geometry We test images with three levels of increasing geometric complexity (*sphere*, *bunny*, *dragon*), which has been found to have a significant effect on material appearance [7], [8].

Illumination Similarly, we test three levels of increasing illumination frequency: The *Uffizi* and *Grace* environment maps [9], plus a directional light.

Stimuli and procedure We use the reduced stimuli from Part 2 in Experiment 1 (Section 5), with a *box* filter kernel. For direction illumination we use l_1. For the images illuminated by an environment map, up to 2048 cosine-weighted samples are traced. We blur the background during rendering to avoid masking effects in the appearance of the tested object. The test is carried out as in Experiment 1. A total of 256 subjects (131 M, 99 F) took part, from which we kept 95% for the analysis.

Results Both *bunny* and *dragon* perform slightly better than *sphere*. This is in accordance with previous work [7], [8], [10], which suggested that more complex objects are more forgiving to artifacts. In our particular case, however, the results show no significant effect ($F = 0.97, p > 0.37$). Similarly, no significant effect was found on illumination ($F = 1.54, p > 0.21$), with all studied light sources (*directional*, and *Grace* and *Uffizi* environment maps) performing similarly. Together, these results confirm that our findings do generalize to more complex geometry and lighting.

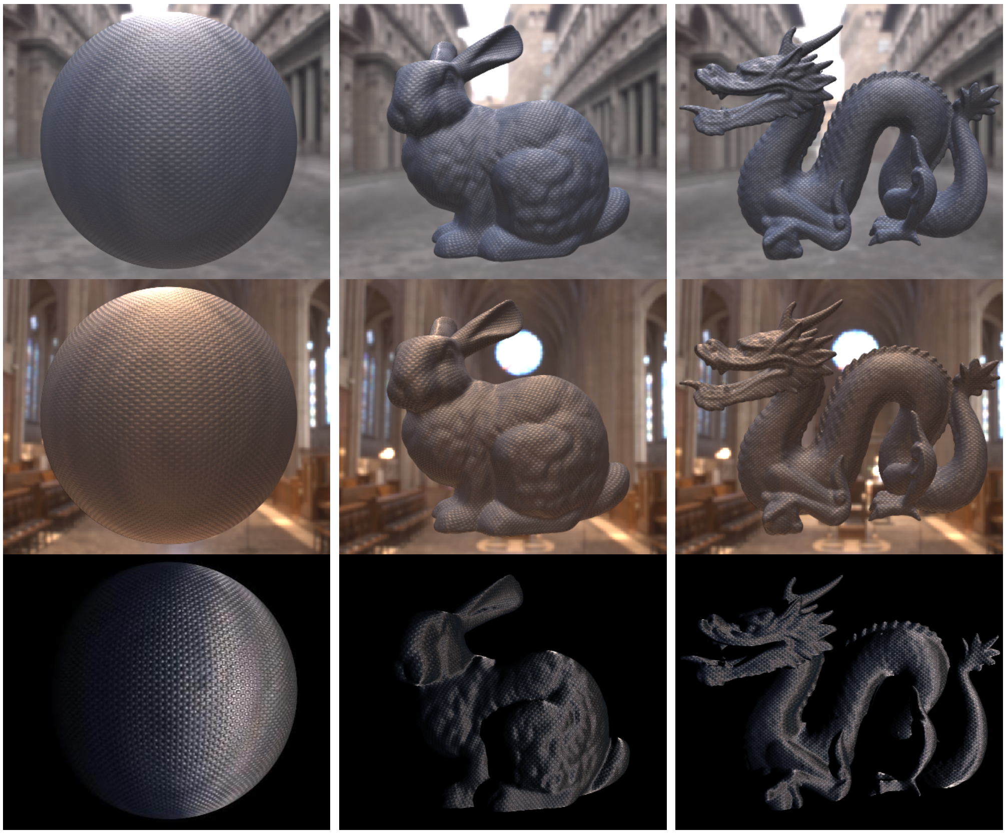


Fig. 5: Reference renderings, using the BTF *Cambrils*, of the scenes used in the validation experiment. From left to right, the three geometries used: *sphere*, *bunny*, and *dragon*, in order of geometrical complexity according to Ramanarayanan et al. Top to bottom, the illumination setups used, ordered from low to high frequency: *Uffizi*, *Grace*, and *directional light*.

APPENDIX G
LOW-LEVEL STATISTICS OF BTFS

In order to give a first step on automatic extraction of high-level descriptors of BTFs, we investigate different low-level statistics of the BTF. The analysis covers a set of metrics based on first-order image statistics [11] and on a set of textural visual features [12]. This statistics have been computed for both different representations of the BTF: images in the spatial domain (i.e. photographs of the BTF taken under different light and view direction), and images in the angular domain (i.e. per-pixel BRDF representation).

For each image (in the spatial or angular domain) we compute several statistics: mean, standard deviation, skewness and kurtosis of the luminances channel of the image. Additionally, we compute the three most significatives textural features defined by Tamura et al. [12]: coarseness, contrast and directionality. We refer to the original paper for the mathematical description of these features.

Then, to compute the general metric of the full BTF, we compute the mean, median, standard deviation, skewness, kurtosis, maximum and minimum, in both the spatial and the angular domains. Note that the statistics used by Filip et al. [10] are included within this set of metrics.

To measure the correlation between the computed BTF statistics and the high-level descriptors presented in Section B we have used Pearson correlation [6], which evaluates the linear association r between the two variables tested, with $r \in [-1, 1]$ ($r = 1$ being perfect linear correlation, $r = -1$ perfect inverse correlation, and $r = 0$ no correlation). We only keep correlations with a significance of 95% ($p < 0.05$). The results of the significant correlations are listed in Table 2.

APPENDIX H
ADDITIONAL RESULTS ON APPLICABILITY

Here we show additional results and comparisons, that extent the already shown in Section 8 of the main text. The result show additional pre-filtered images considered visually equivalent with the reference in our

Domain	General Stat.	Image Stat.	High-Level Prop	r
VL	Mean	LKurtosis	Granular	-0.812236
VL	Mean	DirKurtosis	Granular	-0.811917
VL	Mean	DirKurtosis	Flat	0.805539
VL	Median	DirSkewness	Granular	-0.829850
VL	Median	DirKurtosis	Granular	-0.877730
VL	Median	DirSkewness	Flat	0.810800
VL	Median	DirKurtosis	Flat	0.816263
VL	STD	LSkewness	Granular	-0.836658
VL	Skewness	LMean	Glossy	0.817957
VL	Kurtosis	LMean	Glossy	0.844585
ST	Mean	DirSkewness	Structured	-0.822910
ST	Mean	LSkewness	Glossy	0.803670
ST	Mean	LKurtosis	Glossy	0.822522
ST	Median	DirSkewness	Structured	-0.821881
ST	Median	LSkewness	Glossy	0.808776
ST	Median	LKurtosis	Glossy	0.828666
ST	Max	DirSkewness	Structured	-0.863716
ST	Max	DirKurtosis	Structured	-0.843974
ST	Max	DirSTD	Smooth	-0.806921

TABLE 2: Significant correlations found between low-level BTF statistics and high-level visual properties of the BTF. *Domain* is the space where the statistics have been computed (VL: view-light, ST: spatial); *General Stat.* is the metric used to integrate the measures for all images into a single value for each BTF; *Image Stat.* is the statistic computer, which can be a first-order statistic or a textural feature. The prefix "L" refers to luminances, while "Dir" refers to the directionality of the texture. Note that no value obtained with the measures of coarseness and contrast present significant correlation with visual properties.

Image	**PF Time**	**MS Time**	**Speed-Up**
Cambrils1	7′21″	64′03″	×8.71
Corduroy1	6′49″	56′36″	×8.30
Cambrils2	6′41″	56′20″	×8.42
Proposte1	0′01.7″	1′08″	×40.00
Pulli1	6′45″	55′52″	×8.27
Proposte2	7′02″	60′57″	×8.66
Pulli2	6′39″	55′12″	×8.30
Wool1	2′05″	16′21″	×7.85
Pulli3	2′12″	16′31″	×7.50
Corduroy2	2′07″	16′32″	×7.81

TABLE 3: Rendering times for the images in Figure 6 and Figure 7, both using the pre-filtered representation (PF) and the multi-sampled ground truth (MS).

tests (Figure 6), side-by-side comparisons against the multisampled reference (Figure 7), and the rendering time for each image (Table 3).

Additionally, the graphs showing the performance of compression for each BTF are shown in Figure 8 and Figure 9.

Fig. 6: Examples of equivalent pre-filtered representations of BTFs for different geometries under natural illumination. The larger image shows the multi-sampled reference image at close distance, while the small images show the pre-filtered representation for distances d_2 and d_4. From top to bottom, and from left to right: *Cambrils1* with $s = 0.25$, *Corduroy1* with $s = 0.25$; *Cambrils2* with $s = 0.25$, *Proposte1* with $s = 0.5$; *Pulli1* with $s = 0.25$, and *Proposte2* with $s = 0.25$. Rendering times for d_2 are shown in Table 3.

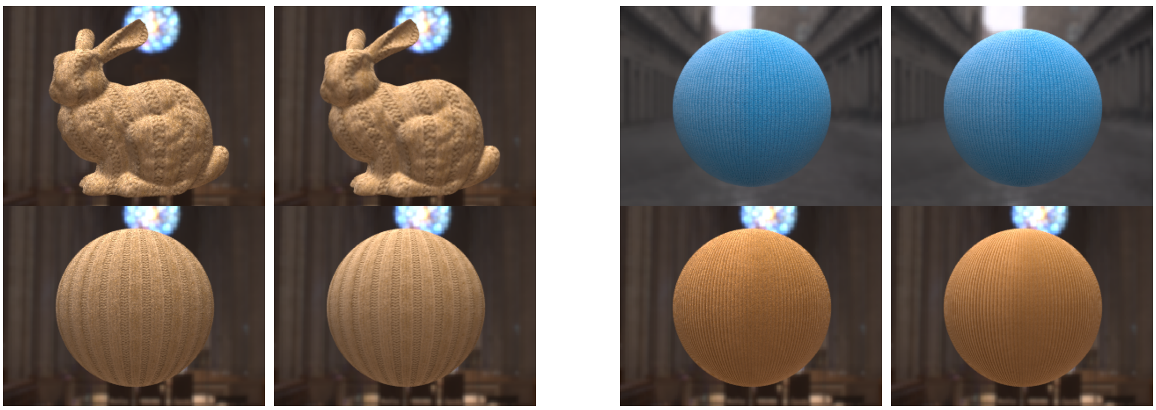


Fig. 7: Comparison between a pre-filtered BTF (left) against its multi-sampled ground truth (right) at distance d_2. From top to bottom, and from left to right: *Pulli2* with $s = 0.25$, *Wool1* with $s = 0.5$, *Pulli3* with $s = 0.25$, and *Corduroy2* with $s = 0.5$. Rendering times are shown in Table 3.

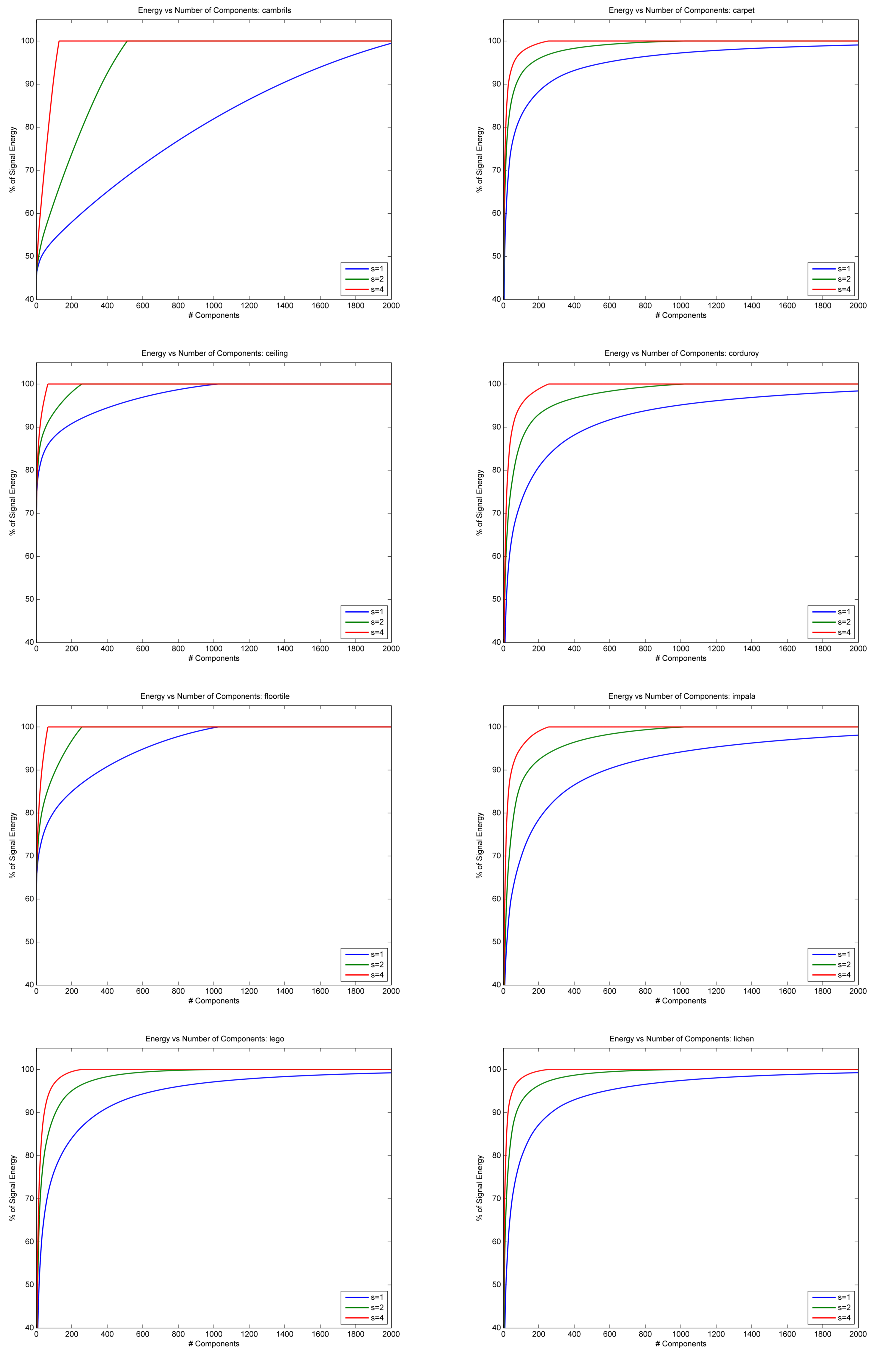


Fig. 8: Percentage of the signal energy stored by the N principal components (x-axis) for all BTFs: From top to bottom, and from left to right: *Cambrils*, *Carpet*, *Ceiling*, *Corduroy*; *Floortile*, *Impala*, *Lego*, and *Lichen*. Each line represents the results of compressing the original BTF ($s = 1$, blue), and its overblurred versions with $s = 2$ (green) and $s = 4$ (red).

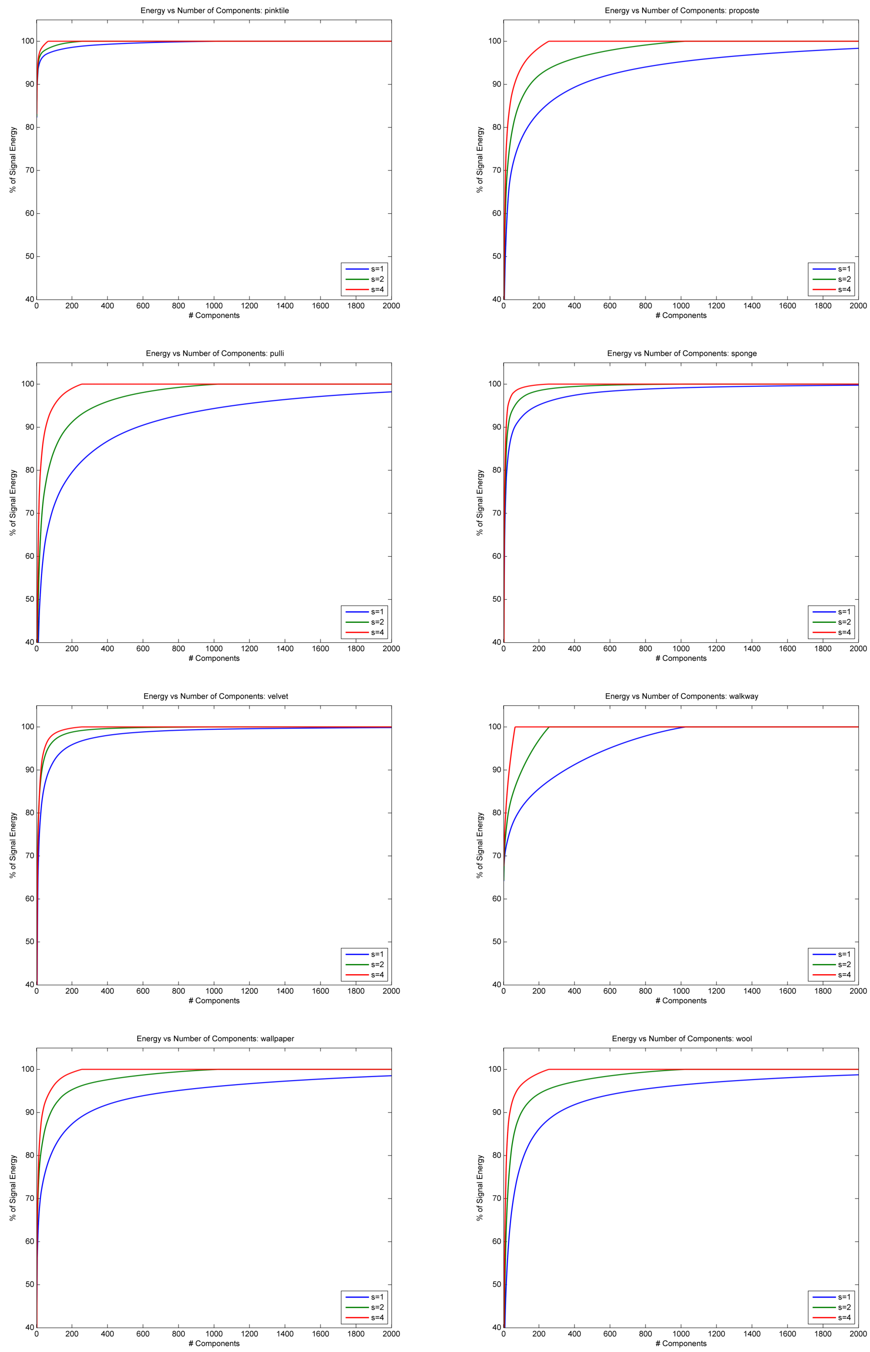


Fig. 9: Percentage of the signal energy stored by the N principal components (x-axis) for all BTFs: From top to bottom, and from left to right: *Pinktile*, *Proposte*, *Pulli*, *Sponge*; *Velvet*, *Walkway*, *Wallpaper* and *Wool*. Each line represents the results of compressing the original BTF ($s = 1$, blue), and its overblurred versions with $s = 2$ (green) and $s = 4$ (red).

APPENDIX I
ANALYSIS

In this section we include the results of the analysis to the data obtained in the perceptual experiments performed. This results have been analyzed using a N-ways Analysis of Variance (ANOVA), to show both main and interaction effects.

I.1 Experiment 1

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.1231	4	39.2808	198.0523	0.0000
Distance d	0.2546	3	0.0849	0.4278	0.7331
Scale s*Distance d	12.4282	12	1.0357	5.2219	0.0000
Error	1376.8440	6942	0.1983		
Total	1546.5552	6961			

TABLE 4: ANOVA results for interactions between Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.1268	4	39.2817	199.0291	0.0000
Distance d	0.2477	3	0.0826	0.4183	0.7398
high-contrast	0.0211	1	0.0211	0.1071	0.7435
Scale s*Distance d	12.3583	12	1.0299	5.2180	0.0000
Scale s*high-contrast	5.5454	4	1.3864	7.0243	0.0000
Distance d*high-contrast	2.4147	3	0.8049	4.0782	0.0067
Scale s*Distance d*high-contrast	2.6609	12	0.2217	1.1235	0.3352
Error	1366.1721	6922	0.1974		
Total	1546.5552	6961			

TABLE 5: ANOVA results for interactions between *high-contrast*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	156.9079	4	39.2270	199.1230	0.0000
Distance d	0.2517	3	0.0839	0.4259	0.7345
granular	0.0318	1	0.0318	0.1616	0.6877
Scale s*Distance d	12.3942	12	1.0328	5.2429	0.0000
Scale s*granular	2.0209	4	0.5052	2.5646	0.0364
Distance d*granular	6.6297	3	2.2099	11.2178	0.0000
Scale s*Distance d*granular	4.5131	12	0.3761	1.9091	0.0287
Error	1363.6250	6922	0.1970		
Total	1546.5552	6961			

TABLE 6: ANOVA results for interactions between *granular*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	156.7046	4	39.1761	206.3217	0.0000
Distance d	0.2479	3	0.0826	0.4353	0.7278
structured	21.8232	1	21.8232	114.9319	0.0000
Scale s*Distance d	12.2171	12	1.0181	5.3618	0.0000
Scale s*structured	10.6866	4	2.6717	14.0703	0.0000
Distance d*structured	4.8284	3	1.6095	8.4762	0.0000
Scale s*Distance d*structured	25.1189	12	2.0932	11.0241	0.0000
Error	1314.3421	6922	0.1899		
Total	1546.5552	6961			

TABLE 7: ANOVA results for interactions between *structured*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	156.8348	4	39.2087	200.0507	0.0000
Distance d	0.2534	3	0.0845	0.4310	0.7308
rough	0.0863	1	0.0863	0.4403	0.5070
Scale s*Distance d	12.2291	12	1.0191	5.1996	0.0000
Scale s*rough	10.5065	4	2.6266	13.4015	0.0000
Distance d*rough	1.9358	3	0.6453	3.2923	0.0197
Scale s*Distance d*rough	7.5564	12	0.6297	3.2128	0.0001
Error	1356.6690	6922	0.1960		
Total	1546.5552	6961			

TABLE 8: ANOVA results for interactions between *rough*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	156.9517	4	39.2379	199.3348	0.0000
Distance d	0.2773	3	0.0924	0.4696	0.7035
feature-dense	6.3235	1	6.3235	32.1246	0.0000
Scale s*Distance d	12.3294	12	1.0274	5.2196	0.0000
Scale s*feature-dense	4.6517	4	1.1629	5.9078	0.0001
Distance d*feature-dense	0.8310	3	0.2770	1.4073	0.2386
Scale s*Distance d*feature-dense	2.4871	12	0.2073	1.0529	0.3963
Error	1362.5562	6922	0.1968		
Total	1546.5552	6961			

TABLE 9: ANOVA results for interactions between *feature-dense*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.1018	4	39.2755	202.2279	0.0000
Distance d	0.2289	3	0.0763	0.3929	0.7581
complex-structure	1.0534	1	1.0534	5.4237	0.0199
Scale s*Distance d	12.4044	12	1.0337	5.3225	0.0000
Scale s*complex-structure	19.9675	4	4.9919	25.7030	0.0000
Distance d*complex-structure	0.5834	3	0.1945	1.0014	0.3911
Scale s*Distance d*complex-structure	10.8997	12	0.9083	4.6768	0.0000
Error	1344.3477	6922	0.1942		
Total	1546.5552	6961			

TABLE 10: ANOVA results for interactions between *complex-structure*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.0614	4	39.2653	201.2678	0.0000
Distance d	0.2655	3	0.0885	0.4536	0.7147
flat	14.8931	1	14.8931	76.3395	0.0000
Scale s*Distance d	12.2472	12	1.0206	5.2314	0.0000
Scale s*flat	7.6279	4	1.9070	9.7749	0.0000
Distance d*flat	0.3872	3	0.1291	0.6616	0.5756
Scale s*Distance d*flat	3.5230	12	0.2936	1.5049	0.1142
Error	1350.4133	6922	0.1951		
Total	1546.5552	6961			

TABLE 11: ANOVA results for interactions between *flat*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.0375	4	39.2594	200.8072	0.0000
Distance d	0.2668	3	0.0889	0.4549	0.7138
relief	8.1957	1	8.1957	41.9199	0.0000
Scale s*Distance d	12.3316	12	1.0276	5.2562	0.0000
Scale s*relief	1.6608	4	0.4152	2.1237	0.0752
Distance d*relief	0.9898	3	0.3299	1.6876	0.1674
Scale s*Distance d*relief	12.6889	12	1.0574	5.4085	0.0000
Error	1353.3050	6922	0.1955		
Total	1546.5552	6961			

TABLE 12: ANOVA results for interactions between *relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.0864	4	39.2716	199.4249	0.0000
Distance d	0.2460	3	0.0820	0.4164	0.7413
sharp-relief	0.1715	1	0.1715	0.8708	0.3508
Scale s*Distance d	12.4016	12	1.0335	5.2480	0.0000
Scale s*sharp-relief	10.5851	4	2.6463	13.4381	0.0000
Distance d*sharp-relief	0.6923	3	0.2308	1.1718	0.3188
Scale s*Distance d*sharp-relief	2.2912	12	0.1909	0.9696	0.4756
Error	1363.1098	6922	0.1969		
Total	1546.5552	6961			

TABLE 13: ANOVA results for interactions between *sharp-relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.4059	4	39.3515	203.2414	0.0000
Distance d	0.2153	3	0.0718	0.3706	0.7742
smooth-relief	0.6514	1	0.6514	3.3645	0.0667
Scale s*Distance d	12.0792	12	1.0066	5.1989	0.0000
Scale s*smooth-relief	9.3373	4	2.3343	12.0563	0.0000
Distance d*smooth-relief	1.9099	3	0.6366	3.2880	0.0198
Scale s*Distance d*smooth-relief	24.5337	12	2.0445	10.5593	0.0000
Error	1340.2329	6922	0.1936		
Total	1546.5552	6961			

TABLE 14: ANOVA results for interactions between *smooth-relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.1167	4	39.2792	198.3572	0.0000
Distance d	0.2569	3	0.0856	0.4324	0.7298
glossy	0.0018	1	0.0018	0.0092	0.9235
Scale s*Distance d	12.4201	12	1.0350	5.2267	0.0000
Scale s*glossy	0.7498	4	0.1874	0.9466	0.4358
Distance d*glossy	2.0663	3	0.6888	3.4781	0.0153
Scale s*Distance d*glossy	3.3151	12	0.2763	1.3951	0.1599
Error	1370.7108	6922	0.1980		
Total	1546.5552	6961			

TABLE 15: ANOVA results for interactions between *glossy*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.0030	4	39.2507	199.5196	0.0000
Distance d	0.2556	3	0.0852	0.4330	0.7294
color	4.2794	1	4.2794	21.7533	0.0000
Scale s*Distance d	12.3384	12	1.0282	5.2266	0.0000
Scale s*color	4.6199	4	1.1550	5.8710	0.0001
Distance d*color	0.9140	3	0.3047	1.5488	0.1997
Scale s*Distance d*color	5.2740	12	0.4395	2.2341	0.0083
Error	1361.7391	6922	0.1967		
Total	1546.5552	6961			

TABLE 16: ANOVA results for interactions between *color*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.2168	4	39.3042	198.5004	0.0000
Distance d	0.2393	3	0.0798	0.4029	0.7509
light	1.4896	1	1.4896	7.5232	0.0061
Scale s*Distance d	12.3696	12	1.0308	5.2059	0.0000
Scale s*light	1.2006	4	0.3002	1.5159	0.1946
Distance d*light	0.3603	3	0.1201	0.6066	0.6107
Scale s*Distance d*light	3.1903	12	0.2659	1.3427	0.1865
Error	1370.5955	6922	0.1980		
Total	1546.5552	6961			

TABLE 17: ANOVA results for interactions between *light*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.3908	4	39.3477	199.0424	0.0000
Distance d	0.2427	3	0.0809	0.4092	0.7464
soft	1.0621	1	1.0621	5.3727	0.0205
Scale s*Distance d	12.4020	12	1.0335	5.2280	0.0000
Scale s*soft	0.4905	4	0.1226	0.6203	0.6480
Distance d*soft	2.6339	3	0.8780	4.4413	0.0040
Scale s*Distance d*soft	4.2899	12	0.3575	1.8084	0.0412
Error	1368.3754	6922	0.1977		
Total	1546.5552	6961			

TABLE 18: ANOVA results for interactions between *soft*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	157.1938	4	39.2984	200.9241	0.0000
Distance d	0.2374	3	0.0791	0.4046	0.7497
hard	0.4927	1	0.4927	2.5189	0.1125
Scale s*Distance d	12.3820	12	1.0318	5.2756	0.0000
Scale s*hard	14.7850	4	3.6962	18.8981	0.0000
Distance d*hard	1.6655	3	0.5552	2.8384	0.0366
Scale s*Distance d*hard	6.0234	12	0.5020	2.5664	0.0022
Error	1353.8634	6922	0.1956		
Total	1546.5552	6961			

TABLE 19: ANOVA results for interactions between *hard*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Light l	0.8843	3	0.2948	1.3522	0.2555
Error	2816.0565	12919	0.2180		
Total	2816.9408	12922			

TABLE 20: ANOVA results for *Light* l

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Kernels	0.5594	2	0.2797	1.3227	0.2665
Error	999.4795	4727	0.2114		
Total	1000.0389	4729			

TABLE 21: ANOVA results for *Kernels*

I.2 Experiment 2

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.5301	3	7.1767	34.3950	0.0000
Distance d	0.3887	1	0.3887	1.8630	0.1724
Scale s*Distance d	1.2097	3	0.4032	1.9325	0.1222
Error	498.4783	2389	0.2087		
Total	521.5728	2396			

TABLE 22: ANOVA results for interactions between *color*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.8770	3	7.2923	35.4095	0.0000
Distance d	0.3633	1	0.3633	1.7640	0.1843
high-contrast	0.1213	1	0.1213	0.5892	0.4428
Scale s*Distance d	1.2670	3	0.4223	2.0508	0.1047
Scale s*high-contrast	2.4448	3	0.8149	3.9571	0.0079
Distance d*high-contrast	4.4118	1	4.4118	21.4222	0.0000
Scale s*Distance d*high-contrast	0.6562	3	0.2187	1.0621	0.3640
Error	490.3504	2381	0.2059		
Total	521.5728	2396			

TABLE 23: ANOVA results for interactions between *high-contrast*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.7784	3	7.2595	35.2296	0.0000
Distance d	0.3881	1	0.3881	1.8836	0.1701
granular	0.0009	1	0.0009	0.0042	0.9484
Scale s*Distance d	1.2251	3	0.4084	1.9817	0.1146
Scale s*granular	1.7657	3	0.5886	2.8562	0.0358
Distance d*granular	1.6056	1	1.6056	7.7918	0.0053
Scale s*Distance d*granular	4.4299	3	1.4766	7.1660	0.0001
Error	490.6324	2381	0.2061		
Total	521.5728	2396			

TABLE 24: ANOVA results for interactions between *granular*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.1210	3	7.0403	34.0503	0.0000
Distance d	0.3493	1	0.3493	1.6894	0.1938
structured	2.5514	1	2.5514	12.3395	0.0005
Scale s*Distance d	1.2724	3	0.4241	2.0514	0.1047
Scale s*structured	3.0121	3	1.0040	4.8559	0.0023
Distance d*structured	0.0112	1	0.0112	0.0542	0.8159
Scale s*Distance d*structured	0.5999	3	0.2000	0.9670	0.4073
Error	492.3034	2381	0.2068		
Total	521.5728	2396			

TABLE 25: ANOVA results for interactions between *structured*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.5473	3	7.1824	34.6479	0.0000
Distance d	0.4000	1	0.4000	1.9295	0.1649
rough	0.4374	1	0.4374	2.1098	0.1465
Scale s*Distance d	1.2591	3	0.4197	2.0246	0.1084
Scale s*rough	2.1918	3	0.7306	3.5245	0.0144
Distance d*rough	0.3225	1	0.3225	1.5556	0.2124
Scale s*Distance d*rough	1.9341	3	0.6447	3.1100	0.0254
Error	493.5753	2381	0.2073		
Total	521.5728	2396			

TABLE 26: ANOVA results for interactions between *rough*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.2759	3	7.0920	34.0151	0.0000
Distance d	0.3756	1	0.3756	1.8015	0.1797
feature-dense	0.5129	1	0.5129	2.4602	0.1169
Scale s*Distance d	1.2262	3	0.4087	1.9604	0.1178
Scale s*feature-dense	0.2695	3	0.0898	0.4309	0.7309
Distance d*feature-dense	0.0102	1	0.0102	0.0489	0.8251
Scale s*Distance d*feature-dense	1.2576	3	0.4192	2.0106	0.1104
Error	496.4249	2381	0.2085		
Total	521.5728	2396			

TABLE 27: ANOVA results for interactions between *feature-dense*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.1397	3	7.0466	34.0765	0.0000
Distance d	0.4042	1	0.4042	1.9549	0.1622
complex-structure	0.9009	1	0.9009	4.3568	0.0370
Scale s*Distance d	1.4238	3	0.4746	2.2951	0.0759
Scale s*complex-structure	2.3834	3	0.7945	3.8419	0.0093
Distance d*complex-structure	1.9827	1	1.9827	9.5881	0.0020
Scale s*Distance d*complex-structure	0.9652	3	0.3217	1.5559	0.1981
Error	492.3599	2381	0.2068		
Total	521.5728	2396			

TABLE 28: ANOVA results for interactions between *complex-structure*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.3430	3	7.1143	34.2234	0.0000
Distance d	0.3178	1	0.3178	1.5290	0.2164
flat	2.0506	1	2.0506	9.8643	0.0017
Scale s*Distance d	1.1790	3	0.3930	1.8906	0.1290
Scale s*flat	0.6755	3	0.2252	1.0831	0.3550
Distance d*flat	0.1377	1	0.1377	0.6626	0.4157
Scale s*Distance d*flat	0.6379	3	0.2126	1.0229	0.3813
Error	494.9597	2381	0.2079		
Total	521.5728	2396			

TABLE 29: ANOVA results for interactions between *flat*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.1210	3	7.0403	34.0503	0.0000
Distance d	0.3493	1	0.3493	1.6894	0.1938
relief	2.5514	1	2.5514	12.3395	0.0005
Scale s*Distance d	1.2724	3	0.4241	2.0514	0.1047
Scale s*relief	3.0121	3	1.0040	4.8559	0.0023
Distance d*relief	0.0112	1	0.0112	0.0542	0.8159
Scale s*Distance d*relief	0.5999	3	0.2000	0.9670	0.4073
Error	492.3034	2381	0.2068		
Total	521.5728	2396			

TABLE 30: ANOVA results for interactions between *relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.8770	3	7.2923	35.4095	0.0000
Distance d	0.3633	1	0.3633	1.7640	0.1843
sharp-relief	0.1213	1	0.1213	0.5892	0.4428
Scale s*Distance d	1.2670	3	0.4223	2.0508	0.1047
Scale s*sharp-relief	2.4448	3	0.8149	3.9571	0.0079
Distance d*sharp-relief	4.4118	1	4.4118	21.4222	0.0000
Scale s*Distance d*sharp-relief	0.6562	3	0.2187	1.0621	0.3640
Error	490.3504	2381	0.2059		
Total	521.5728	2396			

TABLE 31: ANOVA results for interactions between *sharp-relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.2050	3	7.0683	34.7750	0.0000
Distance d	0.3254	1	0.3254	1.6009	0.2059
smooth-relief	1.8753	1	1.8753	9.2261	0.0024
Scale s*Distance d	1.6381	3	0.5460	2.6864	0.0450
Scale s*smooth-relief	9.3676	3	3.1225	15.3623	0.0000
Distance d*smooth-relief	2.6776	1	2.6776	13.1732	0.0003
Scale s*Distance d*smooth-relief	0.7170	3	0.2390	1.1758	0.3175
Error	483.9591	2381	0.2033		
Total	521.5728	2396			

TABLE 32: ANOVA results for interactions between *smooth-relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.4639	3	7.1546	35.0701	0.0000
Distance d	0.3949	1	0.3949	1.9358	0.1643
glossy	0.0119	1	0.0119	0.0581	0.8095
Scale s*Distance d	1.3043	3	0.4348	2.1311	0.0943
Scale s*glossy	1.4150	3	0.4717	2.3120	0.0743
Distance d*glossy	8.3563	1	8.3563	40.9601	0.0000
Scale s*Distance d*glossy	2.8201	3	0.9400	4.6078	0.0032
Error	485.7461	2381	0.2040		
Total	521.5728	2396			

TABLE 33: ANOVA results for interactions between *glossy*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.3538	3	7.1179	34.2541	0.0000
Distance d	0.4040	1	0.4040	1.9440	0.1634
color	0.1208	1	0.1208	0.5816	0.4458
Scale s*Distance d	1.1114	3	0.3705	1.7828	0.1483
Scale s*color	1.9168	3	0.6389	3.0748	0.0266
Distance d*color	0.3883	1	0.3883	1.8688	0.1717
Scale s*Distance d*color	1.3234	3	0.4411	2.1229	0.0953
Error	494.7679	2381	0.2078		
Total	521.5728	2396			

TABLE 34: ANOVA results for interactions between *color*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.5866	3	7.1955	34.5468	0.0000
Distance d	0.3598	1	0.3598	1.7274	0.1889
light	0.0073	1	0.0073	0.0350	0.8516
Scale s*Distance d	1.1831	3	0.3944	1.8935	0.1285
Scale s*light	0.3924	3	0.1308	0.6281	0.5969
Distance d*light	0.0542	1	0.0542	0.2602	0.6101
Scale s*Distance d*light	2.0893	3	0.6964	3.3437	0.0185
Error	495.9244	2381	0.2083		
Total	521.5728	2396			

TABLE 35: ANOVA results for interactions between *light*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.3093	3	7.1031	34.5116	0.0000
Distance d	0.4511	1	0.4511	2.1918	0.1389
soft	1.1168	1	1.1168	5.4264	0.0199
Scale s*Distance d	1.0383	3	0.3461	1.6816	0.1689
Scale s*soft	2.2945	3	0.7648	3.7160	0.0111
Distance d*soft	3.2057	1	3.2057	15.5755	0.0001
Scale s*Distance d*soft	2.0057	3	0.6686	3.2483	0.0210
Error	490.0531	2381	0.2058		
Total	521.5728	2396			

TABLE 36: ANOVA results for interactions between *soft*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	21.8770	3	7.2923	35.4095	0.0000
Distance d	0.3633	1	0.3633	1.7640	0.1843
hard	0.1213	1	0.1213	0.5892	0.4428
Scale s*Distance d	1.2670	3	0.4223	2.0508	0.1047
Scale s*hard	2.4448	3	0.8149	3.9571	0.0079
Distance d*hard	4.4118	1	4.4118	21.4222	0.0000
Scale s*Distance d*hard	0.6562	3	0.2187	1.0621	0.3640
Error	490.3504	2381	0.2059		
Total	521.5728	2396			

TABLE 37: ANOVA results for interactions between *hard*, Scale s and Distance d.

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Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9905	3	2.3302	12.7657	0.0000
high-contrast	0.0542	1	0.0542	0.2972	0.5858
Scale s*high-contrast	0.7341	3	0.2447	1.3406	0.2597
Error	197.3173	1081	0.1825		
Total	205.0597	1088			

TABLE 38: ANOVA results for interactions between *high-contrast*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.8554	3	2.2851	12.5658	0.0000
granular	1.4655	1	1.4655	8.0587	0.0046
Scale s*granular	0.0553	3	0.0184	0.1013	0.9593
Error	196.5849	1081	0.1819		
Total	205.0597	1088			

TABLE 39: ANOVA results for interactions between *granular*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	7.0205	3	2.3402	12.9006	0.0000
structured	1.6464	1	1.6464	9.0759	0.0027
Scale s*structured	0.3645	3	0.1215	0.6699	0.5706
Error	196.0948	1081	0.1814		
Total	205.0597	1088			

TABLE 40: ANOVA results for interactions between *structured*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9604	3	2.3201	12.6737	0.0000
rough	0.0282	1	0.0282	0.1540	0.6948
Scale s*rough	0.1829	3	0.0610	0.3329	0.8015
Error	197.8947	1081	0.1831		
Total	205.0597	1088			

TABLE 41: ANOVA results for interactions between *rough*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	7.1118	3	2.3706	13.1119	0.0000
feature-dense	1.4830	1	1.4830	8.2026	0.0043
Scale s*feature-dense	1.1788	3	0.3929	2.1732	0.0895
Error	195.4439	1081	0.1808		
Total	205.0597	1088			

TABLE 42: ANOVA results for interactions between *feature-dense*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	7.0373	3	2.3458	12.9965	0.0000
complex-structure	0.2227	1	0.2227	1.2339	0.2669
Scale s*complex-structure	2.7701	3	0.9234	5.1158	0.0016
Error	195.1129	1081	0.1805		
Total	205.0597	1088			

TABLE 43: ANOVA results for interactions between *complex-structure*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	7.1107	3	2.3702	13.1692	0.0000
flat	2.8725	1	2.8725	15.9598	0.0001
Scale s*flat	0.6724	3	0.2241	1.2453	0.2920
Error	194.5608	1081	0.1800		
Total	205.0597	1088			

TABLE 44: ANOVA results for interactions between *flat*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	7.0205	3	2.3402	12.9006	0.0000
relief	1.6464	1	1.6464	9.0759	0.0027
Scale s*relief	0.3645	3	0.1215	0.6699	0.5706
Error	196.0948	1081	0.1814		
Total	205.0597	1088			

TABLE 45: ANOVA results for interactions between *relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9905	3	2.3302	12.7657	0.0000
sharp-relief	0.0542	1	0.0542	0.2972	0.5858
Scale s*sharp-relief	0.7341	3	0.2447	1.3406	0.2597
Error	197.3173	1081	0.1825		
Total	205.0597	1088			

TABLE 46: ANOVA results for interactions between *sharp-relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9517	3	2.3172	12.8804	0.0000
smooth-relief	0.0005	1	0.0005	0.0028	0.9578
Scale s*smooth-relief	3.6303	3	1.2101	6.7263	0.0002
Error	194.4750	1081	0.1799		
Total	205.0597	1088			

TABLE 47: ANOVA results for interactions between *smooth-relief*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9778	3	2.3259	12.7318	0.0000
glossy	0.2476	1	0.2476	1.3554	0.2446
Scale s*glossy	0.3721	3	0.1240	0.6789	0.5650
Error	197.4860	1081	0.1827		
Total	205.0597	1088			

TABLE 48: ANOVA results for interactions between *glossy*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9274	3	2.3091	12.6143	0.0000
color	0.0384	1	0.0384	0.2100	0.6468
Scale s*color	0.1814	3	0.0605	0.3303	0.8035
Error	197.8859	1081	0.1831		
Total	205.0597	1088			

TABLE 49: ANOVA results for interactions between *color*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9234	3	2.3078	12.7024	0.0000
light	1.5293	1	1.5293	8.4174	0.0038
Scale s*light	0.1778	3	0.0593	0.3262	0.8064
Error	196.3986	1081	0.1817		
Total	205.0597	1088			

TABLE 50: ANOVA results for interactions between *light*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.6355	3	2.2118	12.1862	0.0000
soft	1.3190	1	1.3190	7.2673	0.0071
Scale s*soft	0.5821	3	0.1940	1.0690	0.3613
Error	196.2046	1081	0.1815		
Total	205.0597	1088			

TABLE 51: ANOVA results for interactions between *soft*, Scale s and Distance d.

Source	Sum Sq.	d.f.	Mean Sq.	F	Prob>F
Scale s	6.9905	3	2.3302	12.7657	0.0000
hard	0.0542	1	0.0542	0.2972	0.5858
Scale s*hard	0.7341	3	0.2447	1.3406	0.2597
Error	197.3173	1081	0.1825		
Total	205.0597	1088			

TABLE 52: ANOVA results for interactions between *hard*, Scale s and Distance d.

Appendix J
Stimuli

In this section it is included the full stimuli used in Experiment 1. The pool of images used as stimuli is the combination of sixteen BTFs, four ratios $r = texel : pixel$ and five filtering scales s, plus the gold standard for each distance d, making a total of 384 images. Figures 10- 17 show all combinations of s and r for each BTF.

Additionally, as supplementary data it is attached a subset of videos from the pool used in both Experiment 2 and Experiment 3. This videos show the test sphere whose texture is represented with a BTF under dynamic lighting (Experiment 2) and point of view (Experiment 3). We show the full stimuli for BTFs *Corduroy* and *Pulli* in Experiment 2 (i.e. four levels of filter scale s plus the reference times two ratios r) and for BTFs *Impala* and *Wool* in Experiment 3 (i.e. four levels of filter scale plus the reference).

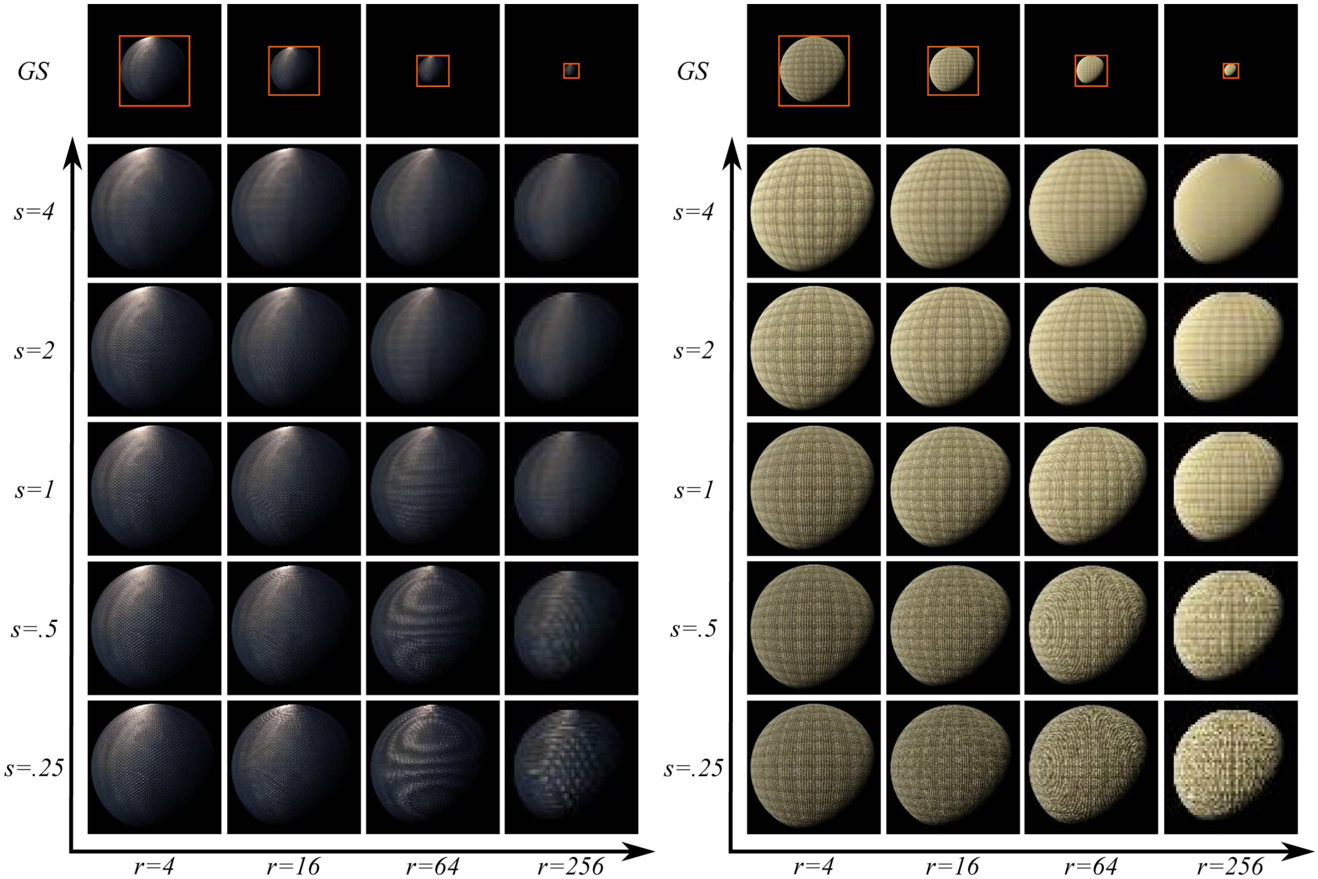

Fig. 10: Stimuli for BTF *Cambrils* (left) and *Carpet* (right), showing all combinations of distance d and filter scale s.

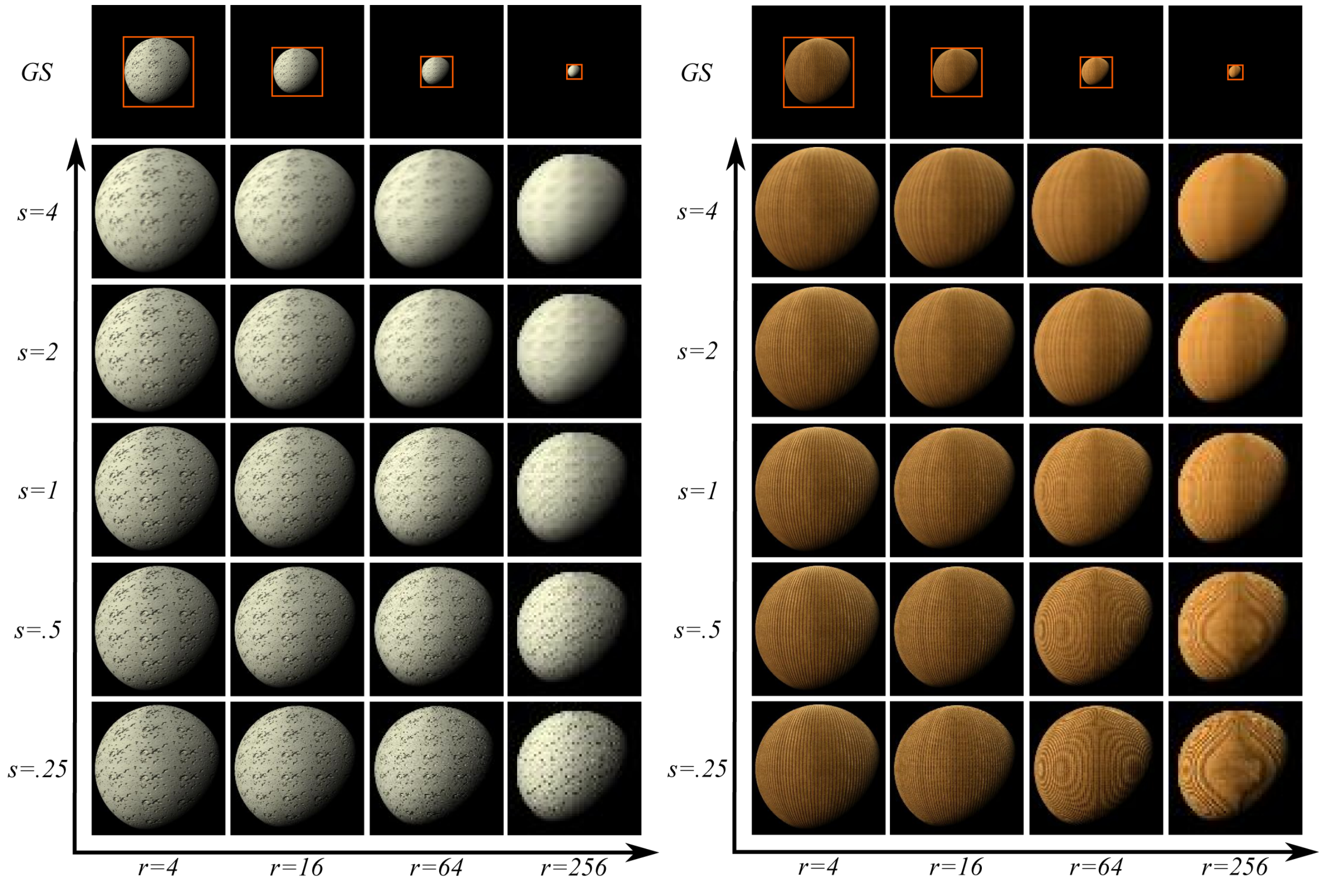

Fig. 11: Stimuli for BTF *Ceiling* (left) and *Corduroy* (right), showing all combinations of distance d and filter scale s.

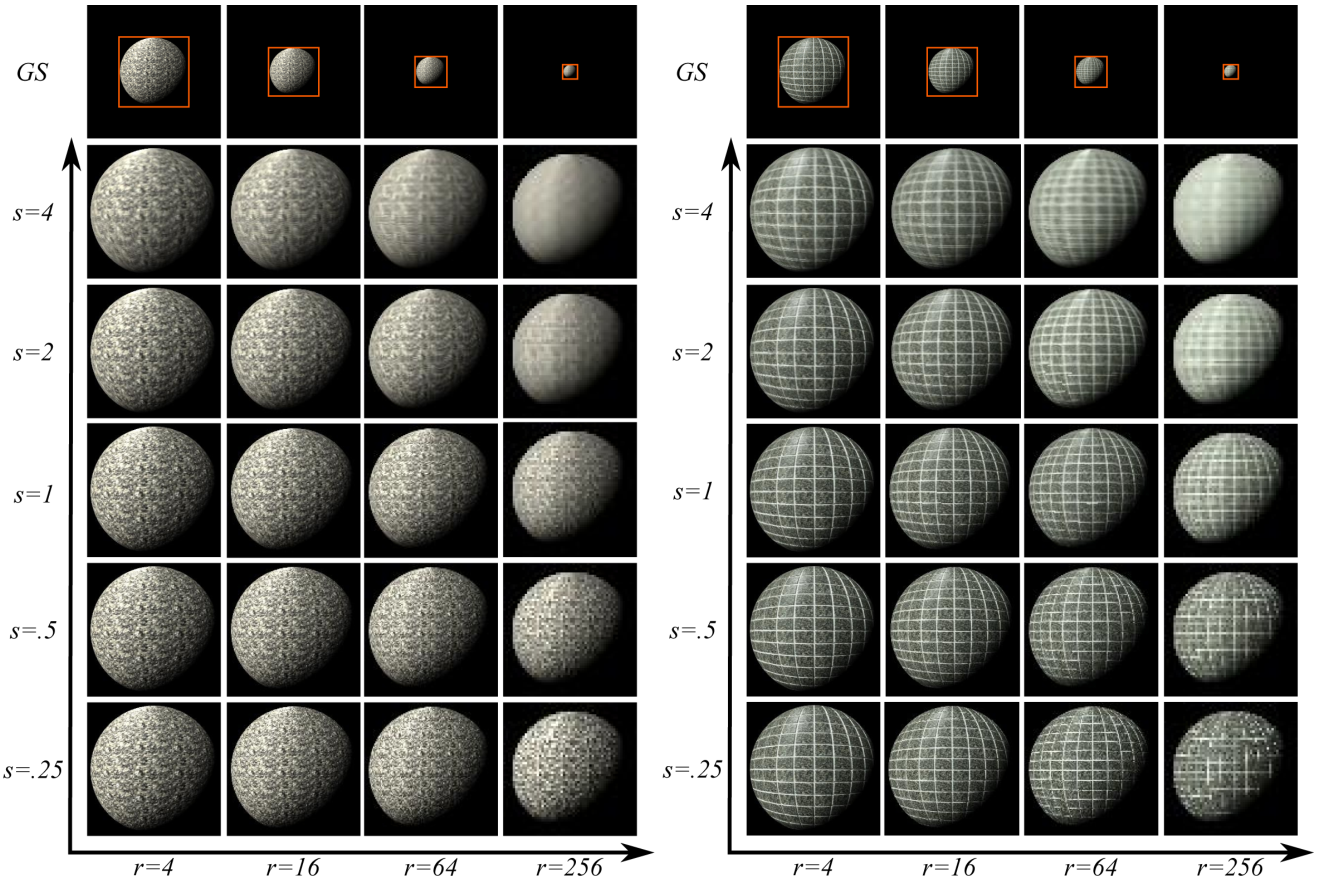

Fig. 12: Stimuli for BTF *Floortile* (left) and *Impala* (right), showing all combinations of distance d and filter scale s.

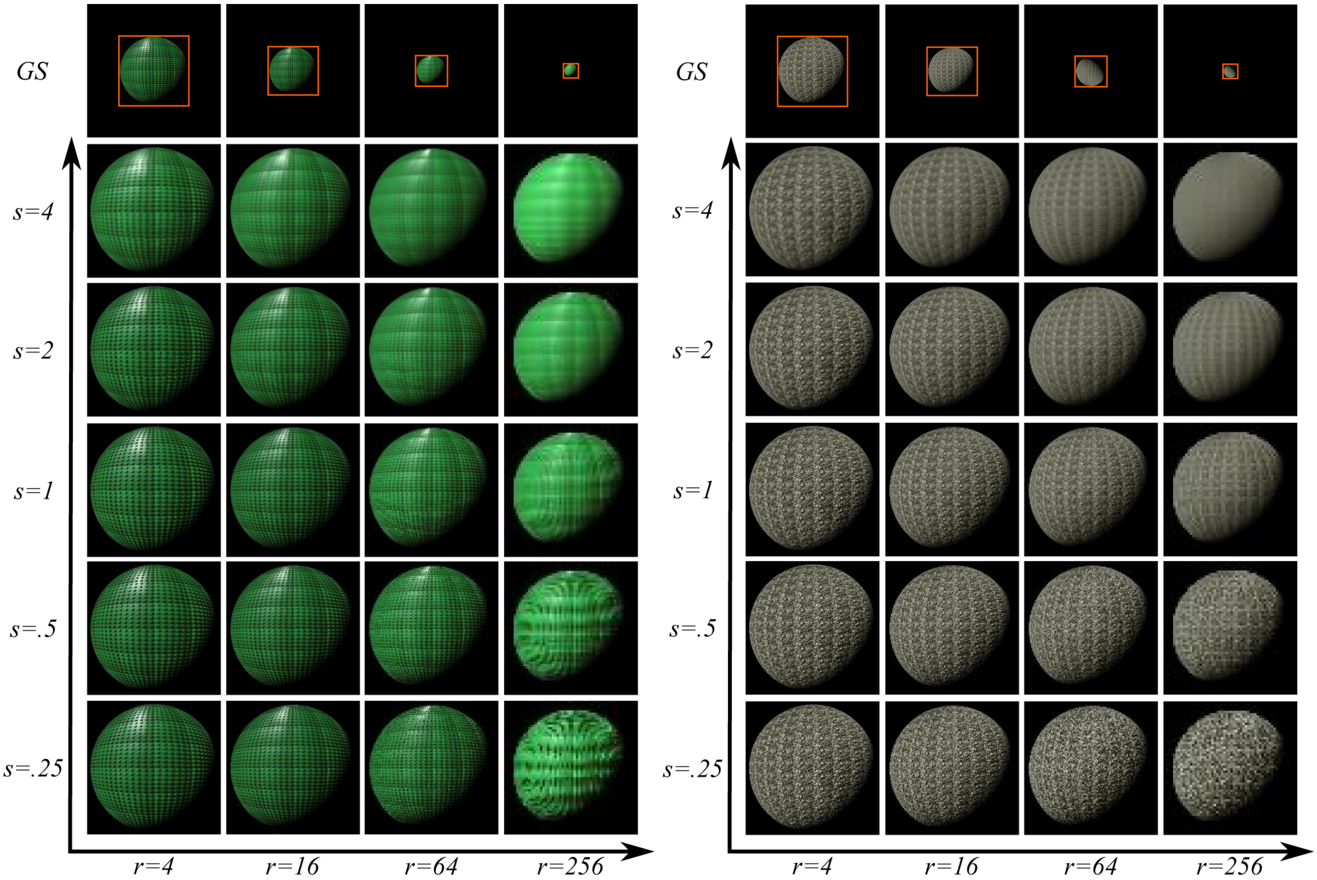

Fig. 13: Stimuli for BTF *Lego* (left) and *Lichen* (right), showing all combinations of distance d and filter scale s.

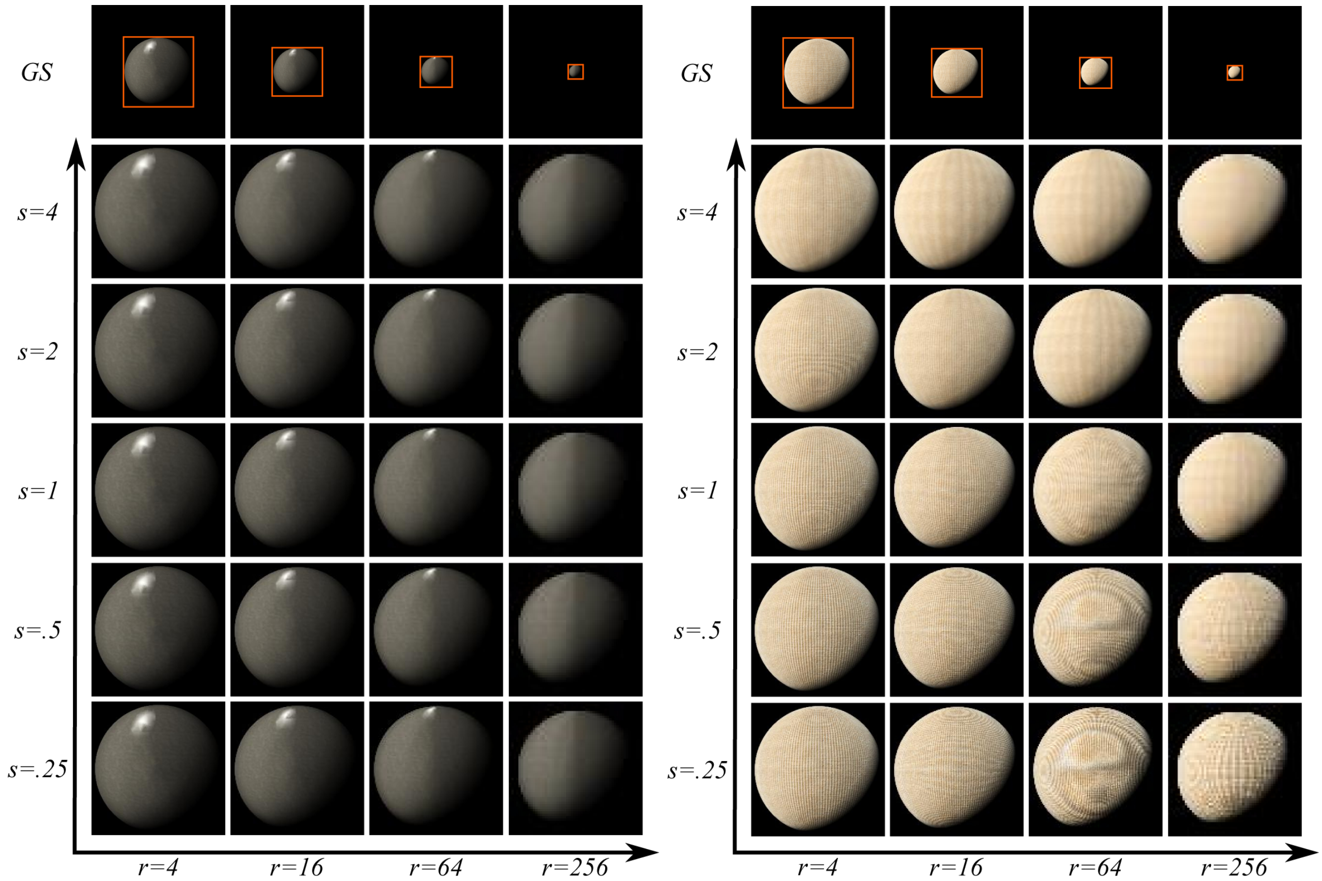

Fig. 14: Stimuli for BTF *Pinktile* (left) and *Proposte* (right), showing all combinations of distance d and filter scale s.

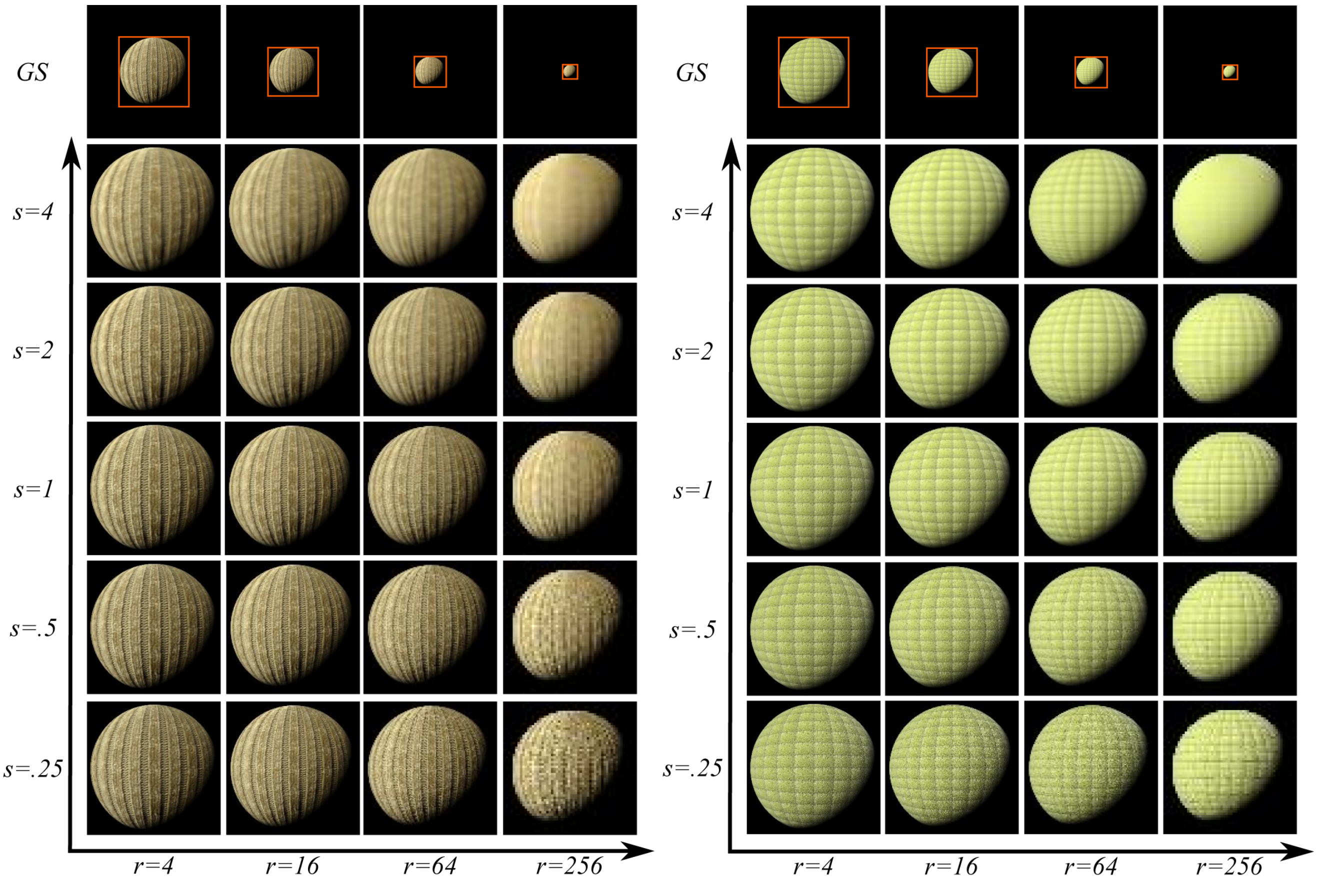

Fig. 15: Stimuli for BTF *Pulli* (left) and *Sponge* (right), showing all combinations of distance d and filter scale s.

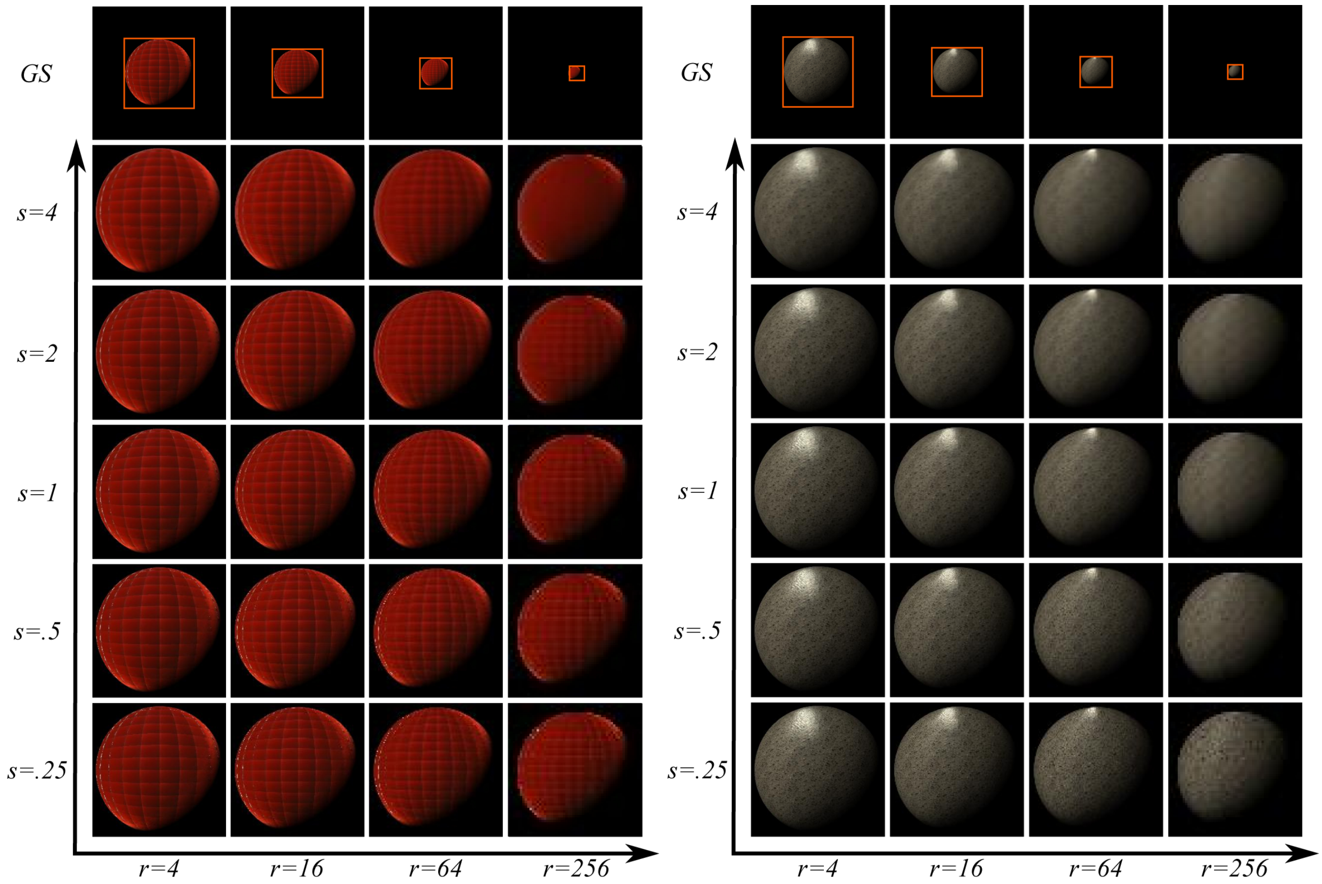

Fig. 16: Stimuli for BTF *Velvet* (left) and *Walkway* (right), showing all combinations of distance d and filter scale s.

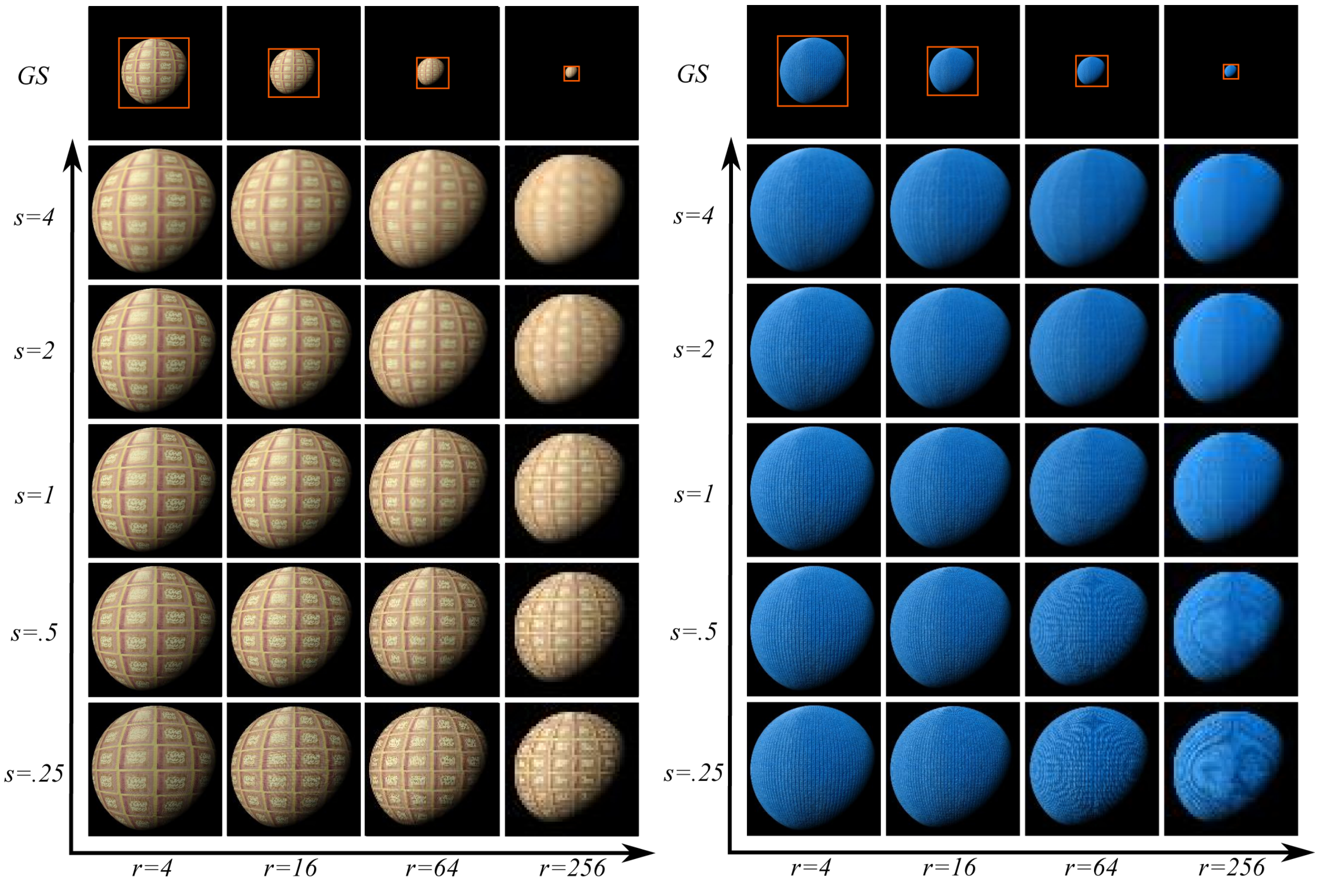

Fig. 17: Stimuli for BTF *Wallpaper* (left) and *Wool* (right), showing all combinations of distance d and filter scale s.

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