Effects of Surface Anisotropy on Perception of Car Body Attractiveness
———————— SUPPLEMENTARY MATERIAL ————————-

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This is supplementary material to a short-paper *Effects of Surface Anisotropy on Perception of Car Body Attractiveness accepted to Pacific Graphics 2018.*

1 Initial car body and anisotropy orientations analysis

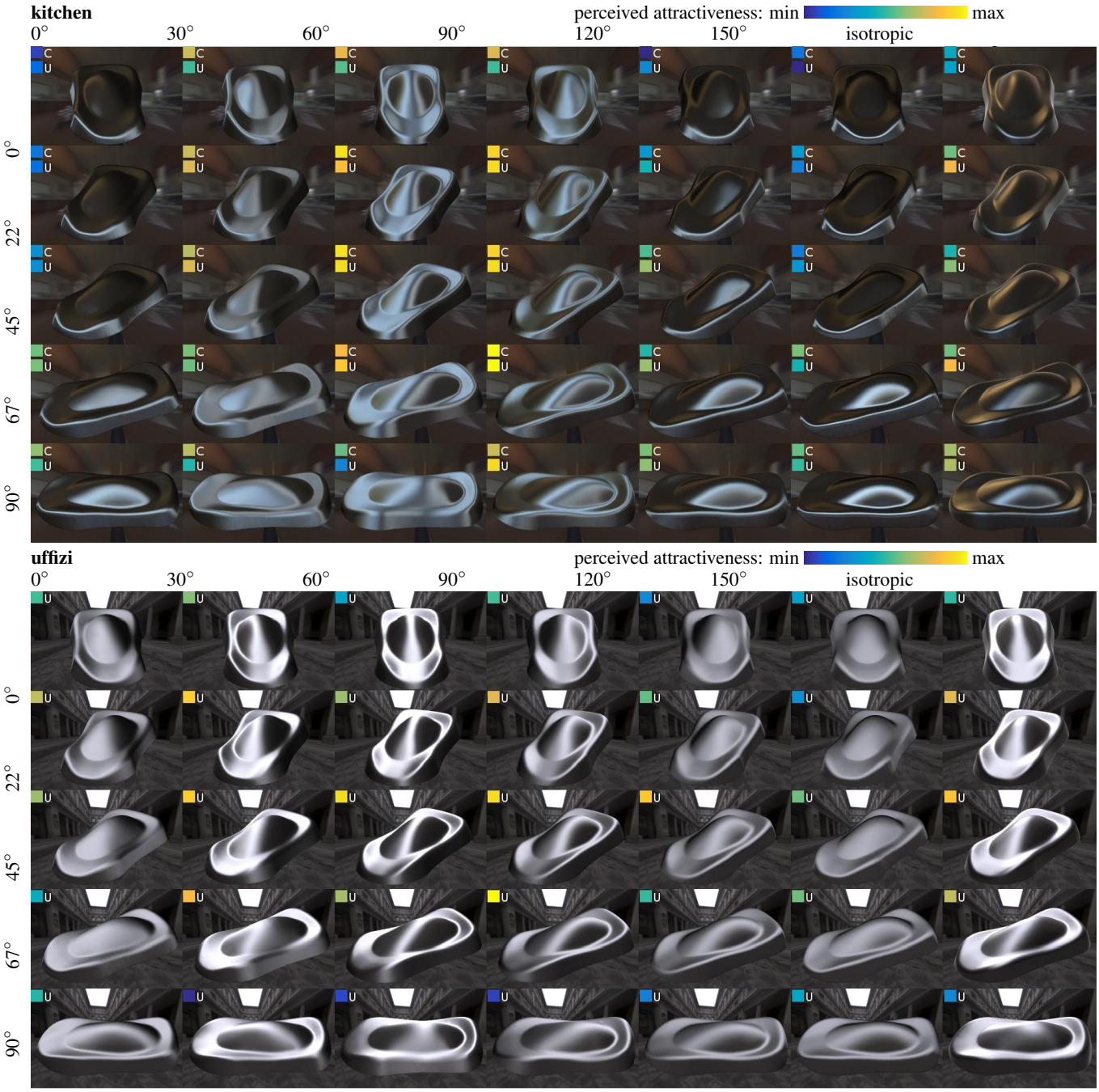

Figure 1: *Material appearance as a function of object orientation (rows) and anisotropy axis alignment (columns). The last column shows isotropic appearance. Inset squares depict color-coded perceived attractiveness for controlled (**C**) and uncontrolled (**U**) visual experiments.*

2 Analysis of illumination environments

Fig. 2 illustrates a distribution of illumination intensity in the tested environments across azimuthal angles. The values were accumulated over polar angles, and the graph clearly illustrates differences in directional illumination uniformity between the tested environments.

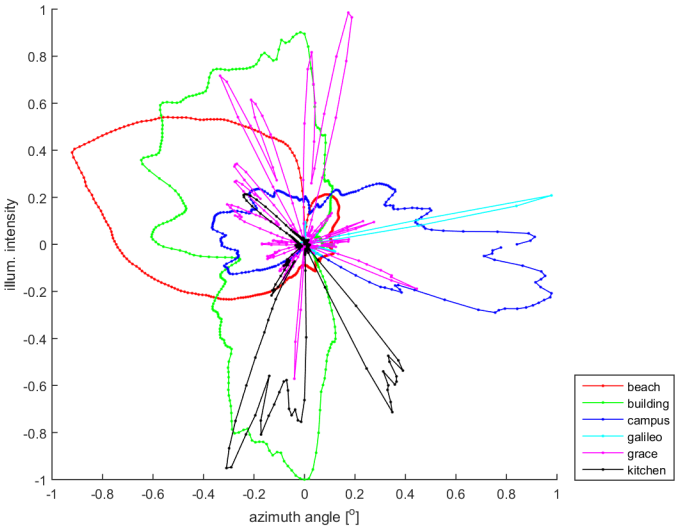

Figure 2: *Azimuthal intensity profiles of tested environments.*

3 Anisotropy orientations analysis – static vs. dynamic stimuli

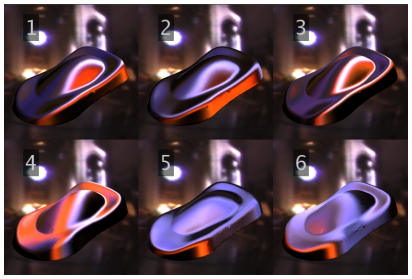

Figure 3: *An example frame of a dynamic stimulus for* grace *illumination environment showing object appearances for different anisotropy axis alignments.*

Fig. 4 depicts all stimuli images with color-coded mean opinion scores of visual attractiveness for both static (S – the upper square) and dynamic (D – the lower square) stimuli.

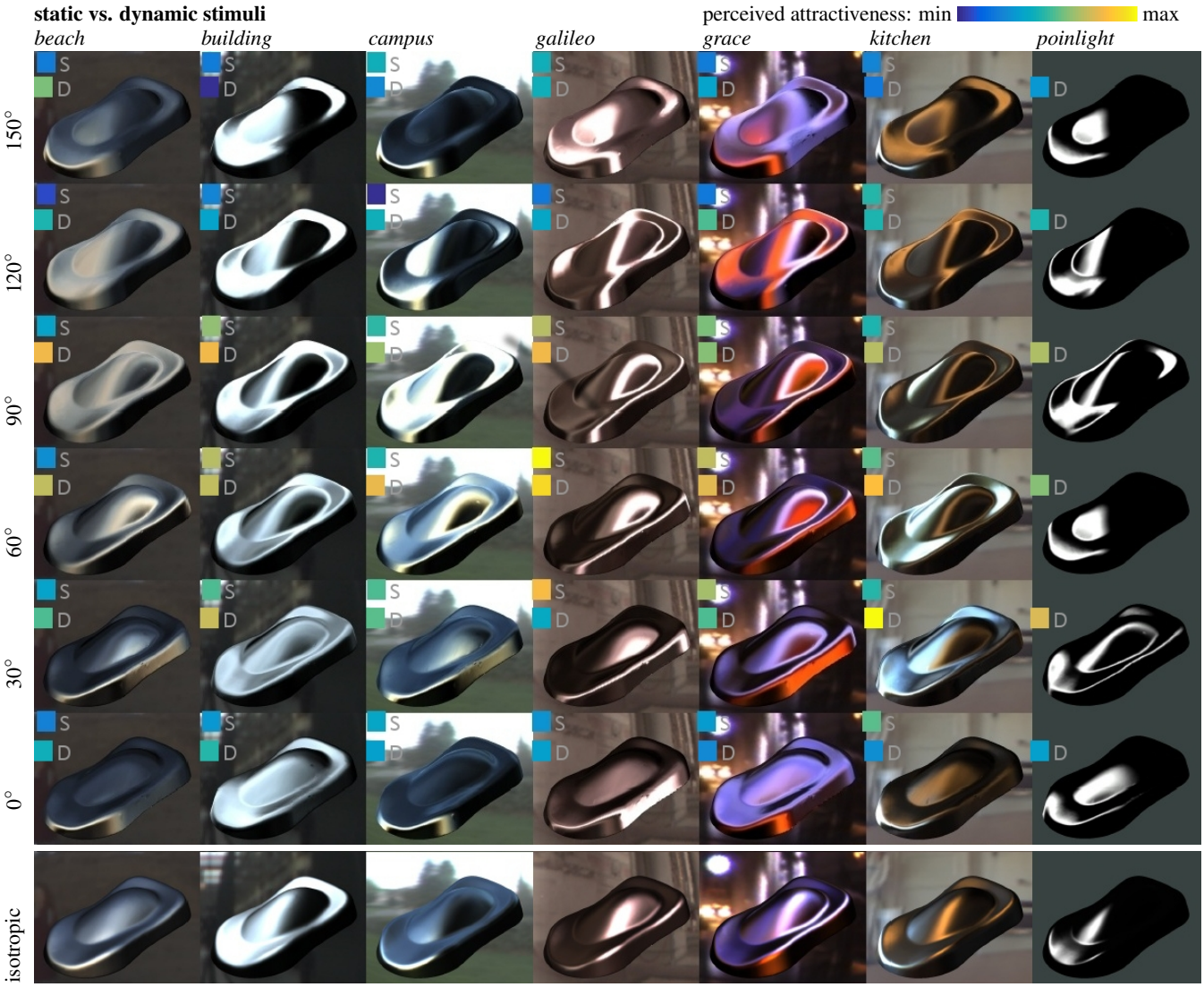

Figure 4: *Material appearance as a function of anisotropy axis alignment (rows) in different illumination environments (columns). The last row shows isotropic appearance. Inset squares depict color-coded perceived attractiveness for static (**S**) and dynamic (**D**) stimuli.*

4 Statistical analysis

Car body orientation analysis

To assess the significance of our results, we performed statistical tests. The Shapiro-Wilk normality test revealed that the subjects's data was not distributed normally at significance level 0.05. As data normality is one of the basic assumptions of ANOVA analysis, we used for further hypotheses testing, non-parametric Kruskal-Wallis tests instead. We tested a null hypothesis assuming that data means for individual object orientations are drawn from the same distribution regardless the object rotation. Tab. 1 shows p-values for individual tested scenarios. We observe that for anisotropic appearance we can reject the null hypothesis, while for isotropic appearance the results are less statistically significant.

Table 1: *Kruskal-Wallis testing p-values across different objects poses.*

	controlled	web-based	
	kitchen	*kitchen*	*uffizi*
anisotropic	$9.4e^{-3}$	$8.3e^{-8}$	$2.5e^{-8}$
isotropic	$5.7e^{-1}$	$1.7e^{-2}$	$2.3e^{-1}$

Anisotropy orientation analysis – static stimuli

Statistical testing using the Kruskal-Wallis test suggests a high significance of data differences both between the anisotropy axis orientation (p-val $1.6e^{-6}$) and illumination environments (p-val $1.4e^{-5}$).

Anisotropy orientation analysis – dynamic stimuli

Kruskal-Wallis tests results showing a high significance of differences between anisotropy orientations (p-values for individual environments below 0.034 as shown in Tab. 2) but low significance of difference between the environments (p-value 0.61). From this behavior we conclude that the appearance of a car body was visually more attractive for anisotropy axis orientation aligned with its lateral axis, regardless of the illumination environment. We assume that this is due to the fact that anisotropy in this alignment positively accents visibility of lateral contours on a car body.

Table 2: *Kruskal-Wallis testing p-values across for anisotropy orientations in individual environments.*

beach	*build.*	*campus*	*galileo*	*grace*	*kitchen*	*point.*
$3.4e^{-2}$	$2.1e^{-8}$	$3.0e^{-3}$	$7.6e^{-6}$	$7.3e^{-3}$	$3.0e^{-8}$	$5.3e^{-3}$