Supplementary Material
Table 1: Grayscale parameters (mean ± SD) measured from \( N = 2000 \) occlusion edges and surfaces from our database.

\[
\begin{array}{cccccc}
\text{8} \times \text{8} & \text{16} \times \text{16} & \text{32} \times \text{32} \\
\text{occlusion} & \text{surface} & \text{occlusion} & \text{surface} & \text{occlusion} & \text{surface} \\
\log \Delta \mu & 4.6 \pm 1.0 & 3.2 \pm 0.8 & 4.4 \pm 0.9 & 3.0 \pm 0.7 & 4.3 \pm 1.1 & 2.9 \pm 0.7 \\
\log \Delta \sigma & 2.7 \pm 1.1 & 2.5 \pm 0.9 & 2.7 \pm 1.0 & 2.3 \pm 0.8 & 2.7 \pm 0.8 & 2.0 \pm 0.7 \\
\log G_B & -1.4 \pm 0.9 & -2.4 \pm 1.1 & -1.4 \pm 1.0 & -2.5 \pm 1.1 & -1.5 \pm 1.0 & -2.5 \pm 1.1 \\
\log \theta & 11.8 \pm 1.1 & 10.9 \pm 1.5 & 14.8 \pm 1.1 & 13.7 \pm 1.4 & 17.5 \pm 1.1 & 16.1 \pm 1.3 \\
\log \rho & 3.8 \pm 0.5 & 3.3 \pm 0.5 & 3.3 \pm 0.4 & 3.3 \pm 0.5 & 3.7 \pm 0.4 & 3.3 \pm 0.4 \\
\end{array}
\]

Table 2: Correlation coefficients between grayscale parameters measured from \( 32 \times 32 \) occlusion edge patches. Similar correlation structure was observed for \( 16 \times 16 \) and \( 8 \times 8 \) occlusion patches.

\[
\begin{array}{cccccc}
\log \Delta \mu & 1.00 & 0.05 & 0.35 & 0.69 & 0.50 \\
\log \Delta \sigma & 0.05 & 1.00 & 0.15 & 0.29 & 0.26 \\
\log G_B & 0.35 & 0.15 & 1.00 & 0.52 & 0.56 \\
\log \theta & 0.69 & 0.29 & 0.52 & 1.00 & 0.82 \\
\log \rho & 0.50 & 0.26 & 0.56 & 0.82 & 1.00 \\
\end{array}
\]
Table 3: Color parameters (mean ± SD) measured from $N = 2000$ occlusion edges and surfaces from our database.

<table>
<thead>
<tr>
<th></th>
<th>8 x 8</th>
<th>16 x 16</th>
<th>32 x 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>log $\Delta \alpha$</td>
<td>$-2.2 \pm 1.1$</td>
<td>$-3.3 \pm 0.9$</td>
<td>$-2.1 \pm 1.0$</td>
</tr>
<tr>
<td>log $\Delta \beta$</td>
<td>$-3.6 \pm 1.0$</td>
<td>$-4.7 \pm 0.8$</td>
<td>$-3.6 \pm 1.0$</td>
</tr>
</tbody>
</table>

Table 4: $d'$ values for each of the parameters for each patch size.

<table>
<thead>
<tr>
<th></th>
<th>8 x 8</th>
<th>16 x 16</th>
<th>32 x 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>log $\Delta \mu$</td>
<td>1.05</td>
<td>1.17</td>
<td>1.08</td>
</tr>
<tr>
<td>log $\Delta \sigma$</td>
<td>0.08</td>
<td>0.28</td>
<td>0.45</td>
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<tr>
<td>log $G_B$</td>
<td>0.95</td>
<td>1.03</td>
<td>0.88</td>
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<tr>
<td>log $E_\theta$</td>
<td>0.74</td>
<td>0.99</td>
<td>1.05</td>
</tr>
<tr>
<td>log $\rho$</td>
<td>1.13</td>
<td>1.21</td>
<td>1.15</td>
</tr>
<tr>
<td>log $\Delta \alpha$</td>
<td>0.78</td>
<td>1.11</td>
<td>1.21</td>
</tr>
<tr>
<td>log $\Delta \beta$</td>
<td>0.76</td>
<td>0.97</td>
<td>1.19</td>
</tr>
</tbody>
</table>

Figure 1: Median agreement between subjects using our novel analysis for several values of $\gamma$. 
Figure 2: Bivariate distributions for all possible combinations of grayscale parameters occlusions (blue) and textures (green). Black and magenta ovals represent 2 SD. Note that there is separation of the distributions, demonstrating that these features may be used to discriminate occlusions and textures.

Figure 3: Bivariate distributions of all possible combinations of color parameters for occlusions (blue) and textures (green). Magenta and black ovals represent 2 SD.
Figure 4: Comparison of different groups of subjects on the grayscale version of the task.

(a) Performance of two subjects who were briefly pre-exposed to the images prior to the first session (S1, S2 - solid black line) was not significantly different than that of three subjects (S3, S4, S5 - dashed black line) having no pre-exposure. Thin dashed lines denote 95% confidence intervals.

(b) The lead author (S0 - solid black black line) was not significantly better at the task than the two subjects (S1, S2 - dashed black line) having brief pre-exposure.
Figure 5: Comparison of quadratic classifier (blue) and support vector machine (SVM) classifier (black) on discriminating occlusions from surfaces using our grayscale feature set.

Figure 6: Schematic illustration of the connections of hidden units with the Gabor filter inputs. Note that the hidden units, while showing some spatial structure and pooling across scale, do not seem to be entirely independent and do not resemble obvious texture edge detectors illustrated in Fig. 18.
Figure 7: Performance of a network with 64 hidden units trained on a pixel representation (green). Note that there is far worse performance on the task than the human subjects (black dashed line).