Drawing Characteristics for Reproducing Traditional Hand-Made Stippling

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Use of stippling
Reproducing the old technique
Origins
Evolution
Centroidal Voronoi Diagram [Deussen et al. 2002]
Centroidal Voronoi Diagram [Secord 2002]
3D/RT/Animation [Meruvia et al. 2003]
Different primitives [Hiller et al. 2003]
Renderbots [Schlechtweg et al. 2005]
Hedcut [Kim et al. 2006]
Zoom, Wang tiles [Kopf et al. 2006]
Example-based [Kim et al. 2009]
Resolution-dependent [Martín et al. 2010]
Structure-aware [Li and Mould 2011]
Creative process
Instrumental task (used concepts)
Effects (color)
Effects (shape)
Effects (size)
Related (Martín et al. 2010)

Some limitations
Help from artists
# Used pens and papers

<table>
<thead>
<tr>
<th>Illustrator</th>
<th>Pen type</th>
<th>Nib size</th>
<th>Paper type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randy Glass</td>
<td>Rotring Rapidograph</td>
<td>0.13mm</td>
<td>FLAX (Medium press)</td>
</tr>
<tr>
<td>Miguel Endara</td>
<td>Sakura Pigma Micron Pen 005</td>
<td>0.20mm</td>
<td>Strathmore 500 Illustration Board (Hot press)</td>
</tr>
<tr>
<td>Elena Piñar</td>
<td>Artline Drawing System</td>
<td>0.50mm</td>
<td>Canson Watercolor (Cold press)</td>
</tr>
</tbody>
</table>
Capturing data

We asked one* fine arts student to draw a ramp with five tones using the three types of pens and three types of papers.
Results (0.13 mm / 25 px)
Results (0.20mm / 38px)
Results (0.50mm / 94px)
Perceptual study

- Constant / Varying
- Regular / Irregular
- Black / Gray
Perceptual study: hypothesis
Perceptual study: hypothesis
Perceptual study: Not totally conclusive

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cold press paper</th>
<th>Medium press paper</th>
<th>Hot press paper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.13</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Color (black / gray)</td>
<td>73 % / 27 %</td>
<td>82 % / 18 %</td>
<td>100 % / 0 %</td>
</tr>
<tr>
<td>Shape (regular / irregular)</td>
<td>55 % / 45 %</td>
<td>36 % / 64 %</td>
<td>27 % / 73 %</td>
</tr>
<tr>
<td>Size (constant / varying)</td>
<td>91 % / 9 %</td>
<td>36 % / 64 %</td>
<td>27 % / 73 %</td>
</tr>
</tbody>
</table>
Implications
Printing

- Dot reproduction
Printing

- High fidelity: ≥ 2400 ppi
- Medium fidelity: ≥ 1200 ppi
- Low fidelity: ≥ 300 ppi
Displaying

Low fidelity
≥ 300ppi
PDF

- Scatter diagram with grid and PDF icon.
- Text: DOT reproduction
- OK: ≥ 300 ppi
- Low fidelity: ≥ 300 ppi
Conclusions from results

Are these conclusions important?

- Mora than 20 papers on stippling
- Almost no distinction between different kinds of stippling
- In some cases related to halftoning

But color, shape and size matters!
Taxonomy: Criterias

- Stipple distribution quality
- Stipple dot quality
- Stippling reproduction size
Taxonomy: Stipple distribution quality
Taxonomy: Stipple dot quality

IRREGULAR

REGULAR

BW

GRAY
Taxonomy: Stipple reproduction size

High fidelity

Low fidelity

Small

Medium

Large
Conclusions

- There are several kinds of stippling
- They must not be mixed without care
- This is related to reproduction
- We propose a taxonomy
  - More clear classification criterias
  - It will make easier the comparations