# Shapes of splattered drops

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## Supporting information

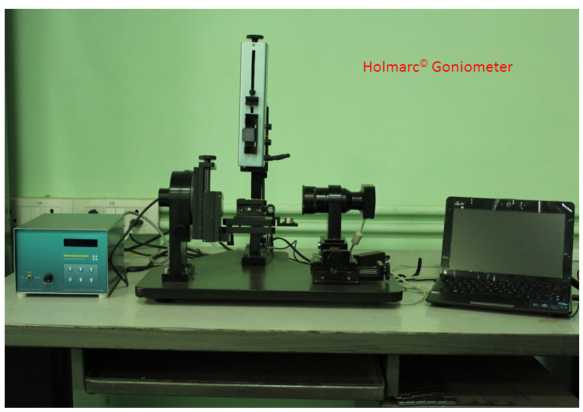


Figure S 1: An image of the optical contact angle measuring instrument (OCMI), also called a goniometer, used for measuring quasi-static macroscopic contact angle. The vertical portion in the center is the motorized syringe pump, used to deliver metered quantities of fluid.

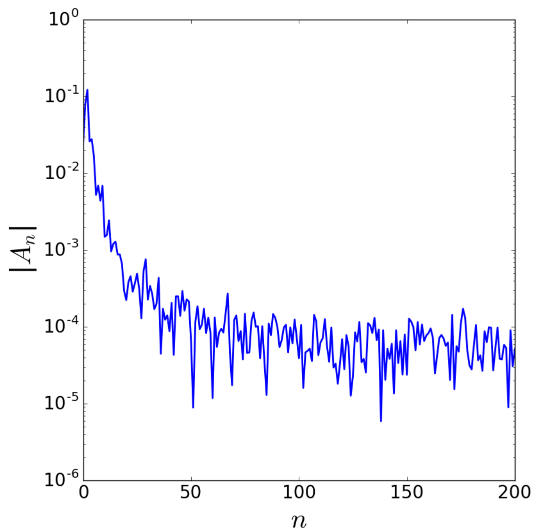


Figure S 2: Plot of the amplitude magnitude ($|A_n|$) associated with each azimuthal mode, $n$ obtained from a Fourier transform of the triple line coordinates. $|A_n|$ decreases with increasing $n$.

## Block size

In our case, the block is defined in terms of feature size that we are interested in. On the triple line, three points are required to calculate curvature at a location. Hence, diameter of the smallest discernible feature is spread over six points, each represented by a pixel in the image. We consider features that are ten times the size of the smallest feature (that span 60 pixels). A block size of 120 pixels is chosen, such that it contains this feature in its entirety. This size is converted into angle from the size of each pixel, and the angular block size thus obtained is used to pick maxima and minima in $\theta_l$. Refer to figure S 3 for an schematic on choosing block size.

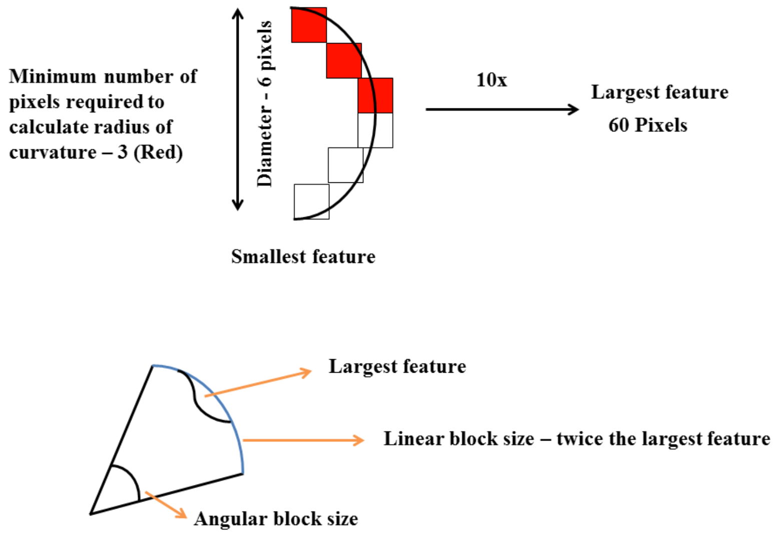


Figure S 3: Choosing the block size for picking maxima and minima.

## Independence of GEV fit on number of drops & image resolution

It is important to ascertain that the number of drops ($N$) is sufficient to achieve converged values for the GEV parameters. Figure S 4 is a plot of the *pdf* for three cases with $N = 7$, 11 and 15. The figure also includes the experimental data from 15 drops to demonstrate convergence in the GEV *pdf* fit as $N$ increases. As can be seen from this figure, the *pdf*s overlap for all values of $N > 11$. The fit values of the GEV parameters and the confidence interval for $\xi$ are given in the figure caption. It can be seen that the fit parameters do not show significant change for $N > 11$. This indicates that 15 drops are sufficient to generate a reliable GEV distribution fit for one liquid-substrate combination.

It is also necessary to ensure that this procedure is not sensitive to resolution of the image used for analysis. For this, the images are scaled down to one-fourth the resolution (half the number of pixels in each direction) and the entire process of extracting contact line coordinates, calculating micro-scale contact angles and extreme value analysis is repeated. The shape factor obtained from the downscaled image data is within one standard deviation to the one obtained from original images, showing that the method is relatively insensitive to image resolution.

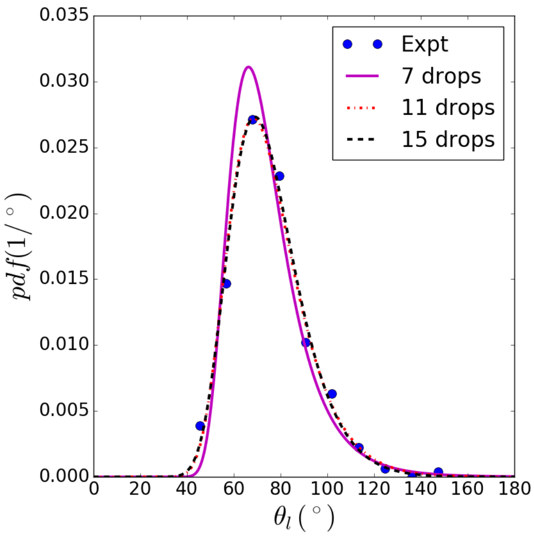


Figure S 4: Plot of the best fit probability density function of the maximum contact angles for Water-Glass for $N = 7, 11$ and 15. The experimental data for $N = 15$ is also indicated. GEV fit parameters $(\omega, \tau, \xi)$ obtained using Maximum Likelihood Estimation technique for $N = 7$ are $(67.0, 11.8, 0.05 \pm 0.14)$, $N = 11$ are $(68.0, 13.5, -0.04 \pm 0.11)$ and $N = 15$ are $(68.1, 13.5, -0.07 \pm 0.08)$. The parameters show convergence for $N > 11$.

## Drop dimensions

Drops are quantified by maximum and minimum dimensions, which are the longest and the shortest line segments passing through the centroid of the drop, intersecting the triple line at opposite ends. These are shown in figure S 5 along with the triple line of the drop superimposed on the actual image of the drop.

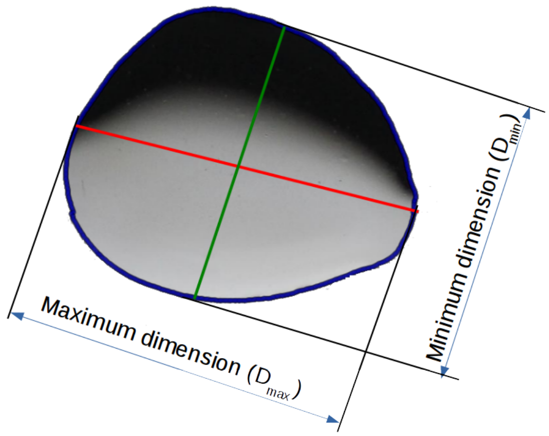


Figure S 5: Image of a drop with the dimensions marked. Droplet triple line is shown in blue colour, around the perimeter of the drop. Maximum dimension ($D_{max}$, red line) and minimum dimension ($D_{min}$, green line) are also marked.

The dimensions of the drops for all the liquid substrate combinations are listed in the following tables S 1 to S 5. The parameters listed are a) maximum dimension ($D_{max}(mm)$), b) minimum dimension ($D_{min}(mm)$), c) length of drop's triple line ($P(mm)$), d) mean diameter ($D_{mean}(mm)$), e) ratio of maximum and minimum dimensions ($D_{max}/D_{min}$) and f) ratio of triple line length ($P$) to perimeter of a circle with $D_{mean}$ as the diameter. For all the liquid substrate combinations, it can be seen that $D_{max}/D_{min}$ is greater than 1, indicating deviation from circular shape. Also, the perimeter of the actual drop is larger than the perimeter of a circle with $D_{mean}$, as the triple line is wrinkled due to defects. Interestingly, $P/(\pi D_{mean})$ in all the cases is close to 1.2.

Table S 1: Dimensions of drops for Glycerin-Acrylic.

| *Drop No.* | $D_{max}$ | $D_{min}$ | $P$ | $D_{mean}$ | $D_{max}/D_{min}$ | $P/(\pi D_{mean})$ |
|---|---|---|---|---|---|---|
| 1 | 6.65 | 5.51 | 20.65 | 6.03 | 1.21 | 1.09 |
| 2 | 7.58 | 5.54 | 22.82 | 6.60 | 1.37 | 1.10 |
| 3 | 6.19 | 5.75 | 20.91 | 5.97 | 1.08 | 1.11 |
| 4 | 6.14 | 5.50 | 20.26 | 5.83 | 1.12 | 1.11 |
| 5 | 6.57 | 5.20 | 20.52 | 5.80 | 1.26 | 1.13 |
| 6 | 6.43 | 5.87 | 21.00 | 6.15 | 1.09 | 1.09 |
| 7 | 6.40 | 5.88 | 20.92 | 6.12 | 1.09 | 1.09 |
| 8 | 6.92 | 5.46 | 22.02 | 6.20 | 1.27 | 1.13 |
| 9 | 7.22 | 6.17 | 23.41 | 6.59 | 1.17 | 1.13 |
| **Mean** | **6.68** | **5.65** | **21.39** | **6.14** | **1.18** | **1.11** |
| **SD** | **0.48** | **0.29** | **1.10** | **0.29** | **0.10** | **0.02** |

Table S 2: Dimensions of drops for TMS.

| *Drop No.* | $D_{max}$ | $D_{min}$ | $P$ | $D_{mean}$ | $D_{max}/D_{min}$ | $P/(\pi D_{mean})$ |
|---|---|---|---|---|---|---|
| 1 | 7.01 | 5.76 | 23.30 | 6.42 | 1.22 | 1.16 |
| 2 | 6.99 | 5.52 | 22.35 | 6.19 | 1.27 | 1.15 |
| 3 | 6.97 | 5.50 | 23.56 | 6.25 | 1.27 | 1.20 |
| 4 | 6.97 | 5.50 | 23.56 | 6.25 | 1.27 | 1.20 |
| 5 | 7.47 | 5.90 | 23.09 | 6.60 | 1.27 | 1.11 |
| 6 | 7.55 | 5.23 | 25.05 | 6.29 | 1.44 | 1.27 |
| 7 | 6.89 | 5.46 | 21.24 | 6.13 | 1.26 | 1.10 |
| 8 | 7.16 | 5.40 | 21.90 | 6.23 | 1.33 | 1.12 |
| 9 | 6.25 | 5.49 | 20.68 | 5.87 | 1.14 | 1.12 |
| 10 | 7.57 | 6.59 | 25.74 | 6.84 | 1.15 | 1.20 |
| 11 | 8.67 | 7.80 | 28.24 | 8.25 | 1.11 | 1.09 |
| 12 | 9.25 | 8.08 | 29.51 | 8.64 | 1.14 | 1.09 |
| 13 | 7.24 | 5.87 | 24.59 | 6.61 | 1.23 | 1.18 |
| **Mean** | **7.38** | **6.01** | **24.06** | **6.66** | **1.24** | **1.15** |
| **SD** | **0.79** | **0.92** | **2.59** | **0.83** | **0.09** | **0.05** |

Table S 3: Dimensions of drops for TOFS.

| *Drop No.* | $D_{max}$ | $D_{min}$ | $P$ | $D_{mean}$ | $D_{max}/D_{min}$ | $P/(\pi D_{mean})$ |
|---|---|---|---|---|---|---|
| 1 | 8.34 | 5.70 | 26.61 | 6.93 | 1.46 | 1.22 |
| 2 | 8.30 | 4.95 | 24.90 | 6.64 | 1.68 | 1.19 |
| 3 | 8.59 | 5.64 | 26.08 | 6.88 | 1.52 | 1.21 |
| 4 | 7.81 | 5.51 | 24.81 | 6.56 | 1.42 | 1.20 |
| 5 | 7.65 | 5.56 | 24.97 | 6.48 | 1.38 | 1.23 |
| 6 | 9.09 | 5.30 | 28.83 | 7.04 | 1.71 | 1.30 |
| 7 | 8.91 | 5.75 | 27.97 | 6.92 | 1.55 | 1.29 |
| 8 | 7.95 | 5.95 | 26.06 | 6.97 | 1.34 | 1.19 |
| 9 | 7.95 | 5.95 | 26.06 | 6.97 | 1.34 | 1.19 |
| 10 | 7.18 | 5.81 | 23.18 | 6.40 | 1.24 | 1.15 |
| **Mean** | **8.18** | **5.61** | **25.95** | **6.78** | **1.46** | **1.22** |
| **SD** | **0.59** | **0.31** | **1.63** | **0.23** | **0.15** | **0.05** |

Table S 4: Dimensions of drops for WA.

| *Drop No.* | $D_{max}$ | $D_{min}$ | $P$ | $D_{mean}$ | $D_{max}/D_{min}$ | $P/(\pi D_{mean})$ |
|---|---|---|---|---|---|---|
| 1 | 7.43 | 5.48 | 22.70 | 6.27 | 1.36 | 1.15 |
| 2 | 6.27 | 5.33 | 19.91 | 5.78 | 1.17 | 1.10 |
| 3 | 6.27 | 4.83 | 20.37 | 5.58 | 1.30 | 1.16 |
| 4 | 5.78 | 5.05 | 18.54 | 5.35 | 1.15 | 1.10 |
| 5 | 6.17 | 5.19 | 20.11 | 5.69 | 1.19 | 1.13 |
| 6 | 6.18 | 5.24 | 20.35 | 5.70 | 1.18 | 1.14 |
| 7 | 6.79 | 5.35 | 21.38 | 5.99 | 1.27 | 1.14 |
| 8 | 6.28 | 5.12 | 20.00 | 5.68 | 1.23 | 1.12 |
| 9 | 5.75 | 5.18 | 18.93 | 5.44 | 1.11 | 1.11 |
| 10 | 5.67 | 4.36 | 18.14 | 4.99 | 1.30 | 1.16 |
| 11 | 5.27 | 4.77 | 17.20 | 5.00 | 1.10 | 1.09 |
| 12 | 7.43 | 5.48 | 22.70 | 6.27 | 1.36 | 1.15 |
| **Mean** | **6.27** | **5.12** | **20.03** | **5.64** | **1.23** | **1.13** |
| **SD** | **0.66** | **0.33** | **1.69** | **0.42** | **0.09** | **0.02** |

Table S 5: Dimensions of drops for WG.

| *Drop No.* | $D_{max}$ | $D_{min}$ | $P$ | $D_{mean}$ | $D_{max}/D_{min}$ | $P/(\pi D_{mean})$ |
|---|---|---|---|---|---|---|
| 1 | 6.35 | 6.04 | 21.21 | 3.09 | 1.05 | 1.09 |
| 2 | 6.62 | 5.83 | 21.24 | 3.12 | 1.14 | 1.09 |
| 3 | 7.28 | 6.08 | 22.56 | 3.28 | 1.20 | 1.09 |
| 4 | 8.68 | 6.26 | 27.67 | 3.56 | 1.39 | 1.24 |
| 5 | 9.96 | 7.31 | 29.61 | 4.21 | 1.36 | 1.12 |
| 6 | 6.25 | 4.76 | 19.93 | 2.76 | 1.31 | 1.15 |
| 7 | 6.66 | 5.47 | 22.45 | 3.02 | 1.22 | 1.18 |
| 8 | 8.43 | 5.27 | 24.95 | 3.36 | 1.60 | 1.18 |
| 9 | 7.97 | 5.00 | 23.49 | 3.25 | 1.59 | 1.15 |
| 10 | 8.71 | 5.94 | 25.99 | 3.45 | 1.47 | 1.20 |
| 11 | 8.04 | 6.51 | 25.59 | 3.53 | 1.23 | 1.15 |
| 12 | 7.73 | 5.51 | 23.46 | 3.20 | 1.40 | 1.17 |
| 13 | 10.01 | 7.15 | 30.95 | 4.36 | 1.40 | 1.13 |
| 14 | 6.60 | 5.93 | 23.03 | 3.15 | 1.11 | 1.16 |
| 15 | 7.80 | 5.30 | 25.98 | 3.32 | 1.47 | 1.25 |
| 16 | 7.96 | 6.83 | 26.11 | 3.61 | 1.17 | 1.15 |
| **Mean** | **7.82** | **5.95** | **24.64** | **3.39** | **1.32** | **1.16** |
| **SD** | **1.17** | **0.74** | **3.06** | **0.41** | **0.17** | **0.05** |