

# **Style and Abstraction in Portrait Sketching**

## ***supplemental materials***

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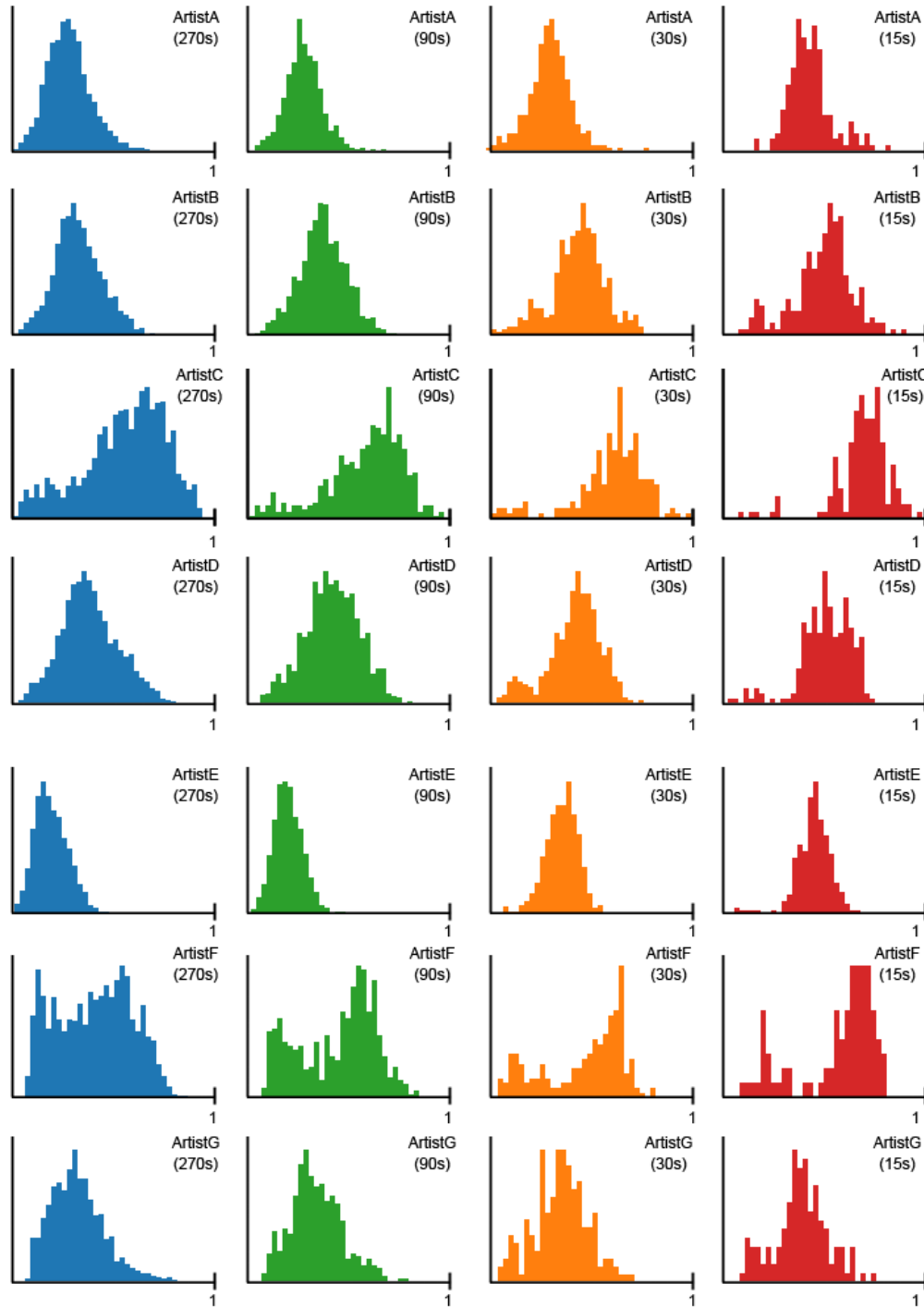
	270	90	30	15		270	90	30	15		270	90	30	15
ArtA	69%	69%	69%	71%	ArtA	26%	28%	28%	23%	ArtA	5%	3%	3%	6%
ArtB	61%	58%	56%	55%	ArtB	37%	38%	40%	38%	ArtB	2%	4%	4%	7%
ArtC	50%	42%	39%	41%	ArtC	45%	52%	53%	52%	ArtC	5%	6%	8%	7%
ArtD	92%	92%	85%	80%	ArtD	7%	6%	11%	14%	ArtD	1%	2%	4%	6%
ArtE	54%	57%	67%	63%	ArtE	37%	35%	25%	28%	ArtE	9%	8%	8%	9%
ArtF	25%	25%	31%	29%	ArtF	66%	67%	63%	66%	ArtF	9%	8%	6%	5%
ArtG	49%	26%	29%	41%	ArtG	45%	69%	67%	52%	ArtG	6%	5%	4%	7%

(a) simple (b) complex (c) shading

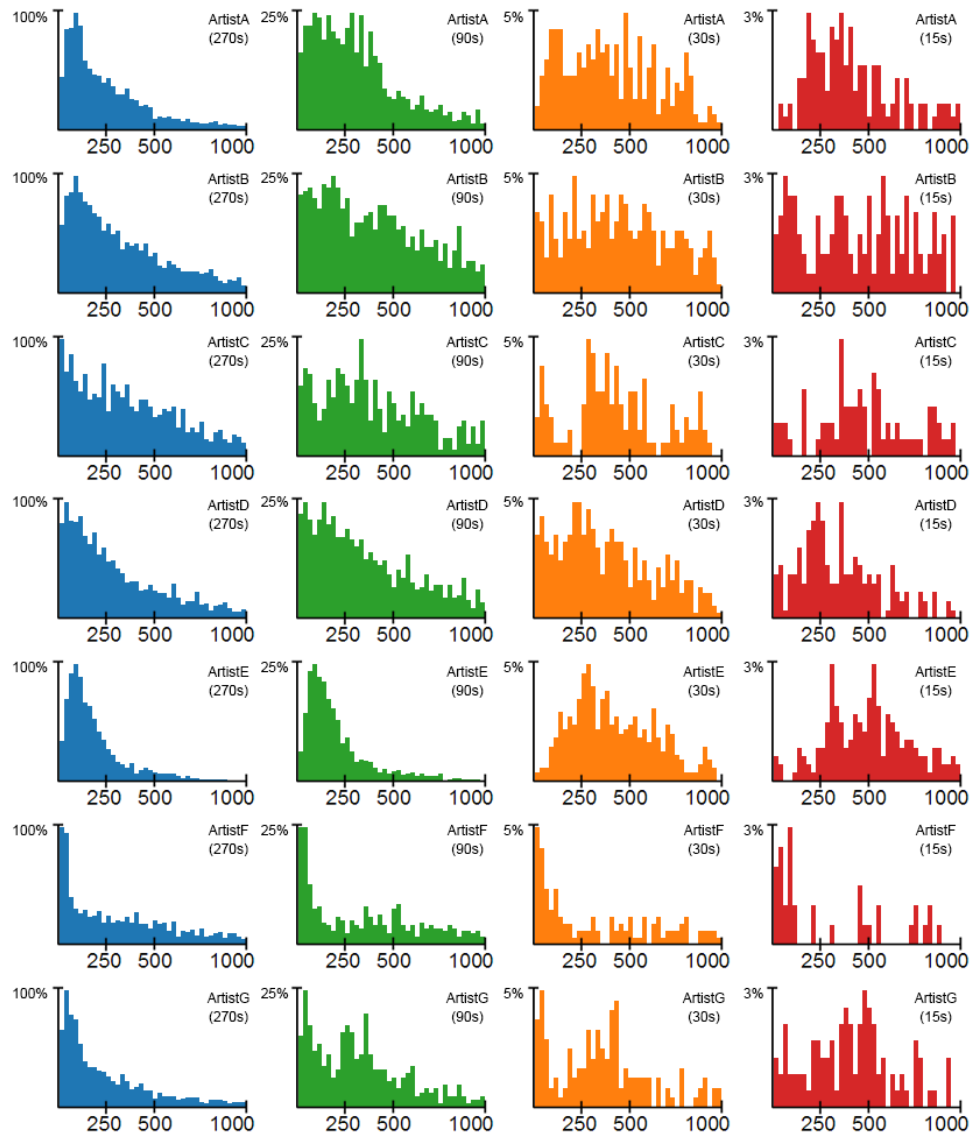
**Figure 1:** Stroke types distribution for 7 artists and 4 abstraction levels.

	270			90			30			15		
	mean	Standard deviation	percentile 90	mean	Standard deviation	percentile 90	mean	Standard deviation	percentile 90	mean	Standard deviation	percentile 90
Artist A	54.20	67.38	117.60	72.09	80.34	156.29	113.02	133.19	253.33	191.34	257.35	437.19
Artist B	140.68	196.06	333.79	160.41	177.58	358.81	197.74	217.87	439.82	222.32	278.57	542.29
Artist C	101.45	157.16	237.31	130.13	157.00	297.50	171.50	204.86	369.96	214.45	275.85	429.06
Artist D	44.95	55.10	93.36	51.27	70.15	107.94	127.30	112.17	259.13	186.48	334.61	340.58
Artist E	126.97	189.79	296.72	131.35	157.77	304.20	128.94	137.84	292.39	130.09	155.36	324.82
Artist F	99.47	123.88	220.56	141.13	181.46	307.06	229.76	330.80	515.23	342.27	426.36	775.37
Artist G	81.74	126.23	199.29	110.75	135.95	250.87	164.04	255.15	385.36	204.32	304.64	489.30

**Figure 2:** Stroke lengths (in pixels) for each artists for sketches with size  $576 \times 576$

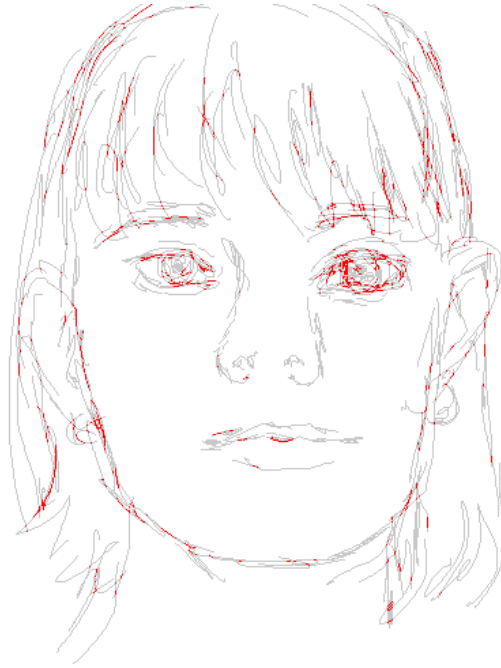


**Figure 3:** Pen pressure normalized histograms. For each artists in all abstraction levels. We can see the higher the level of abstraction the less sensitive the artist become with using the stylus on the Wacom.

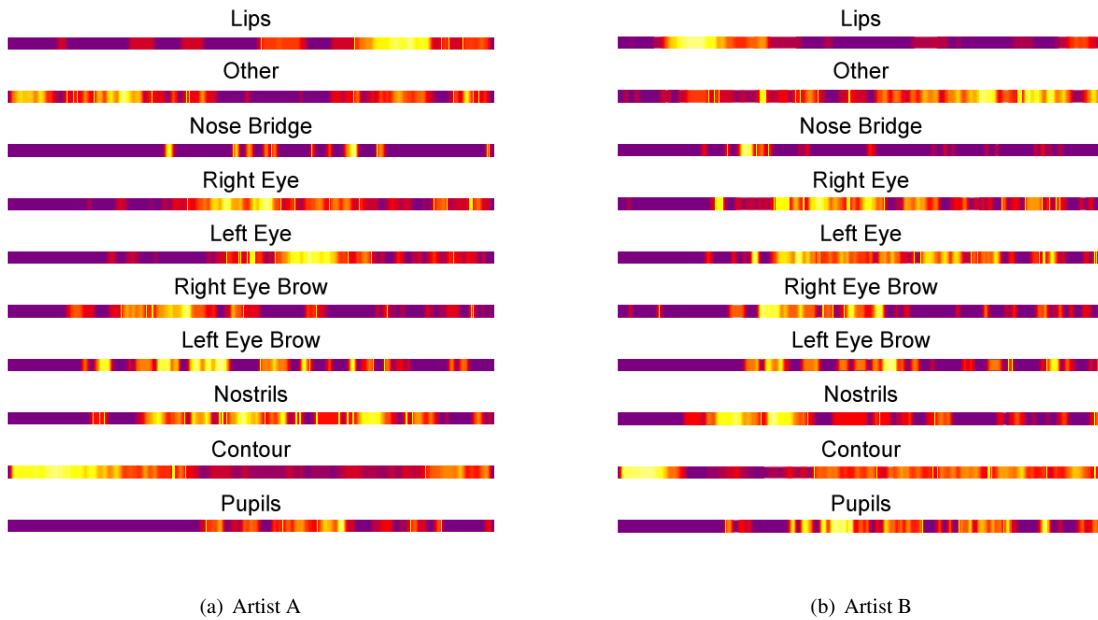


**Figure 4:** Normalized stroke lengths histogram for 7 artists in every abstraction level. We can see the shift in the distribution toward longer strokes when the sketch becomes more abstract.

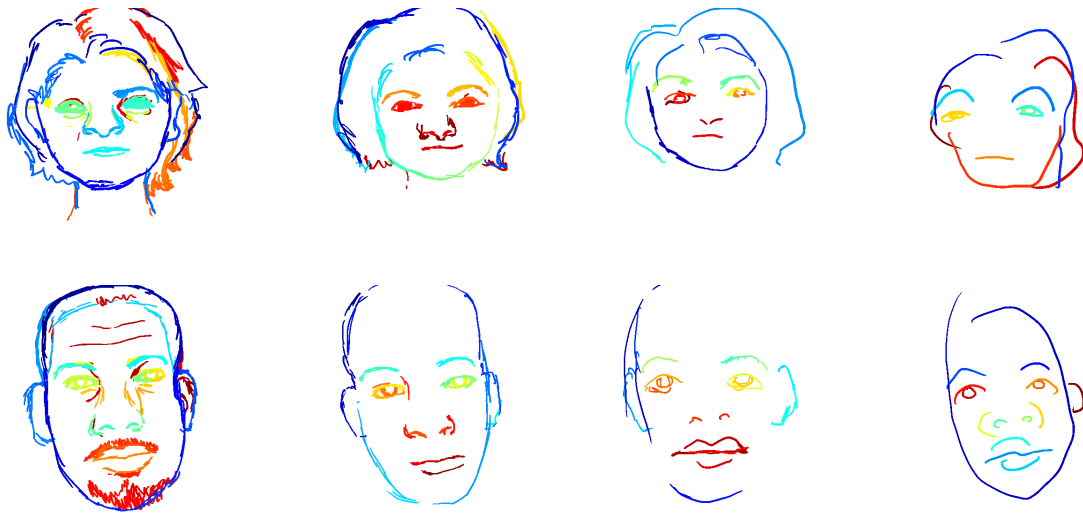




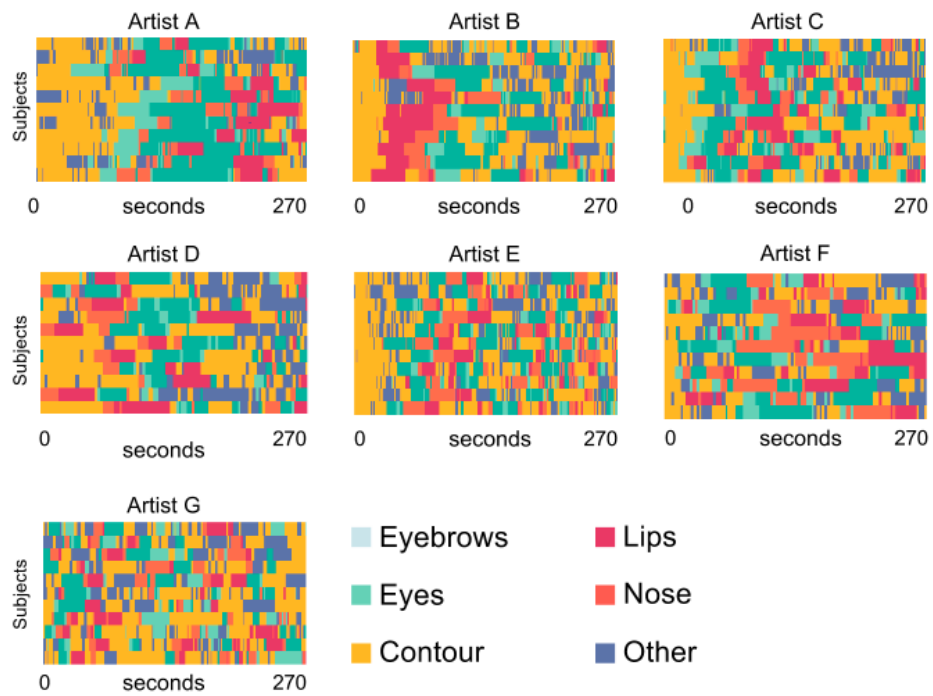
**Figure 5:** An example of the overlap between strokes. The red pixels are where strokes overlap. To estimate the amount of overlap in a sketch of an artist we calculate the ratio of red pixels to all stroke pixels.



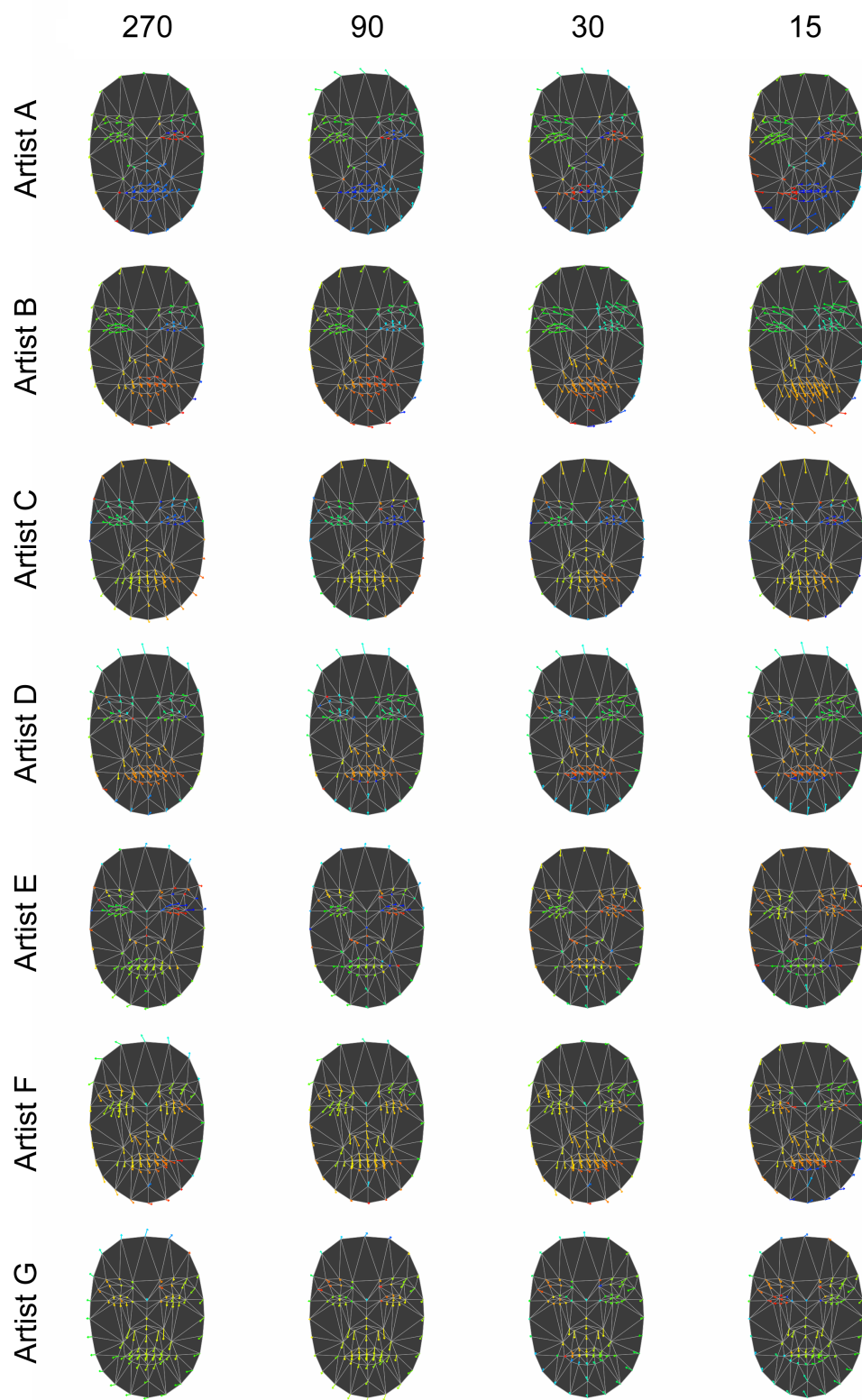
**Figure 6:** Examples for the temporal PDF of two artists for different facial features in the least abstract drawing. The lighter the color, the higher the probability a stroke from this feature will be drawn at the specified time.



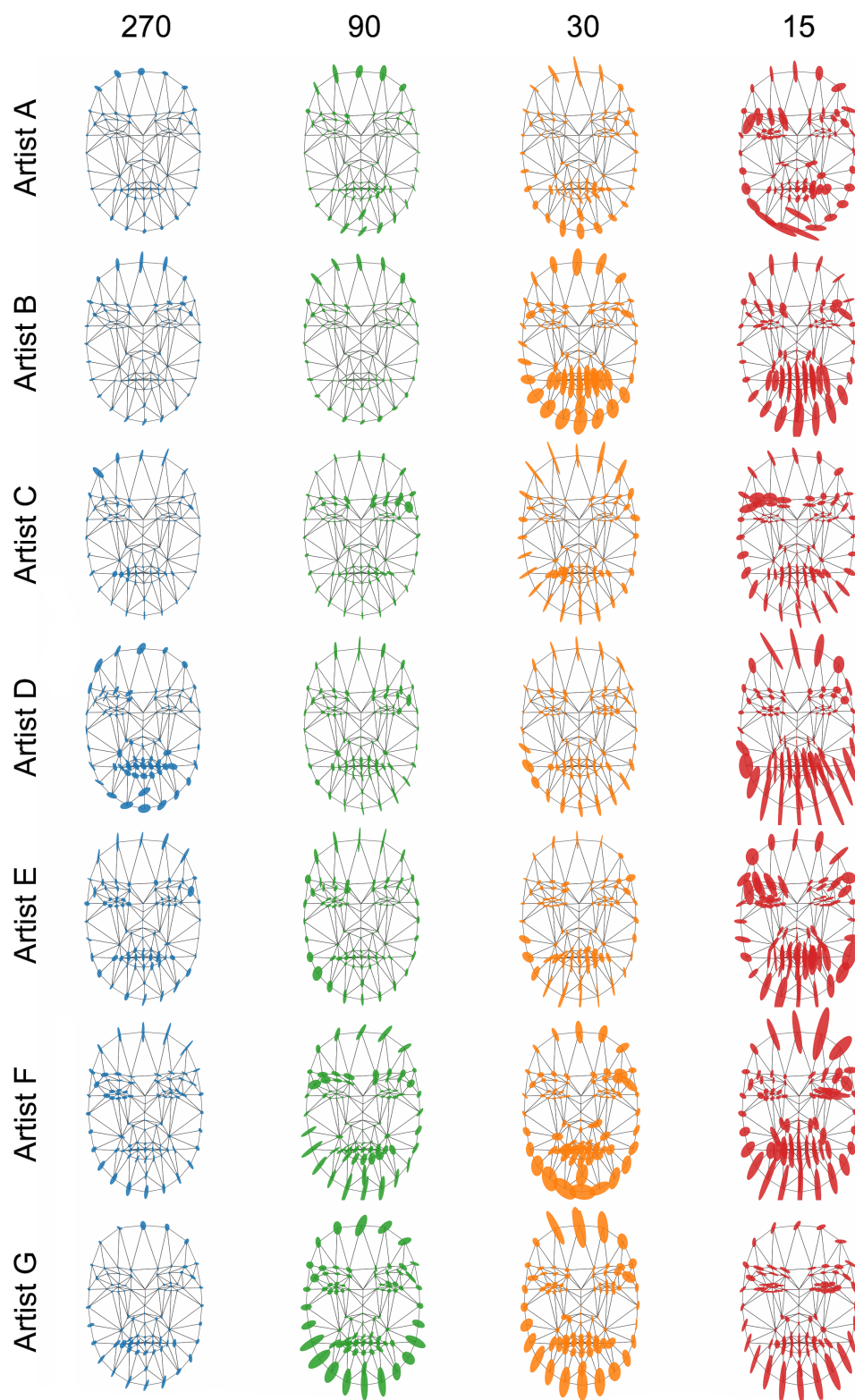
**Figure 7:** Color mapping the time of drawing a stroke from blue to red.



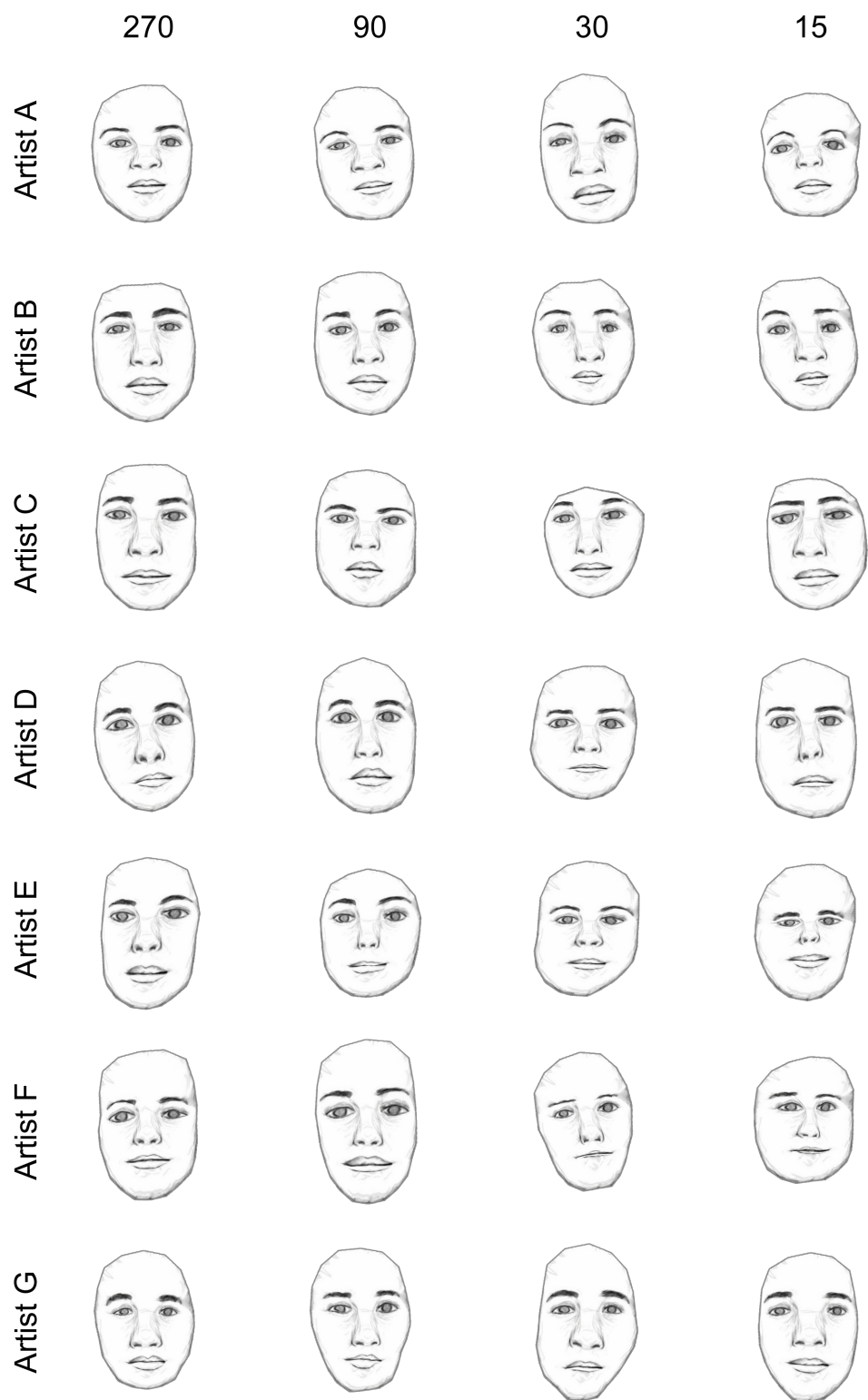
**Figure 8:** Timeline of artists' sketching (270s), each color represents a different facial feature, and each row in the matrix represents a different subject.



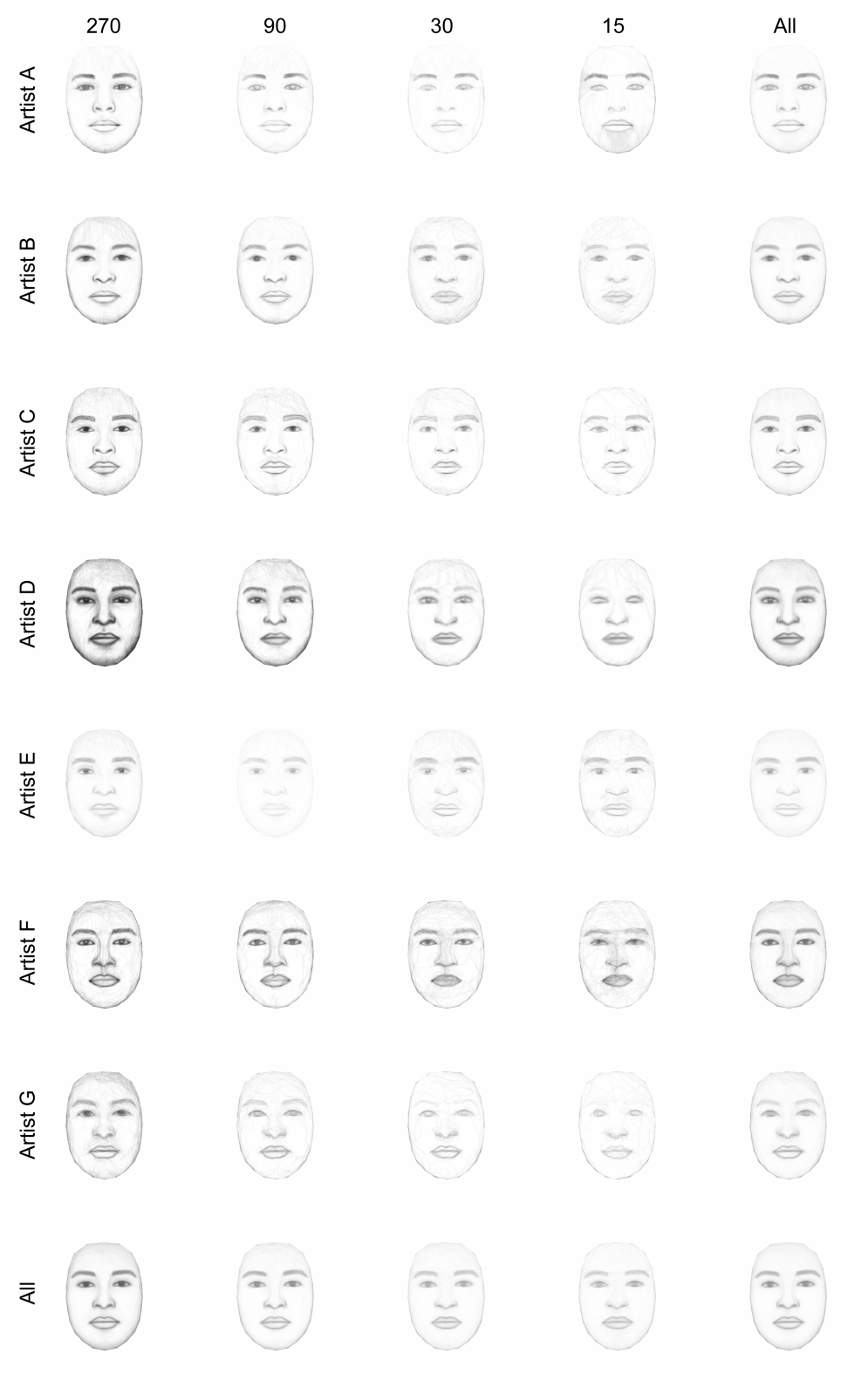
**Figure 9:** The offset vectors of all artists in all abstraction levels define the the artist's general stylistic interpretation in terms of the shape of the face.



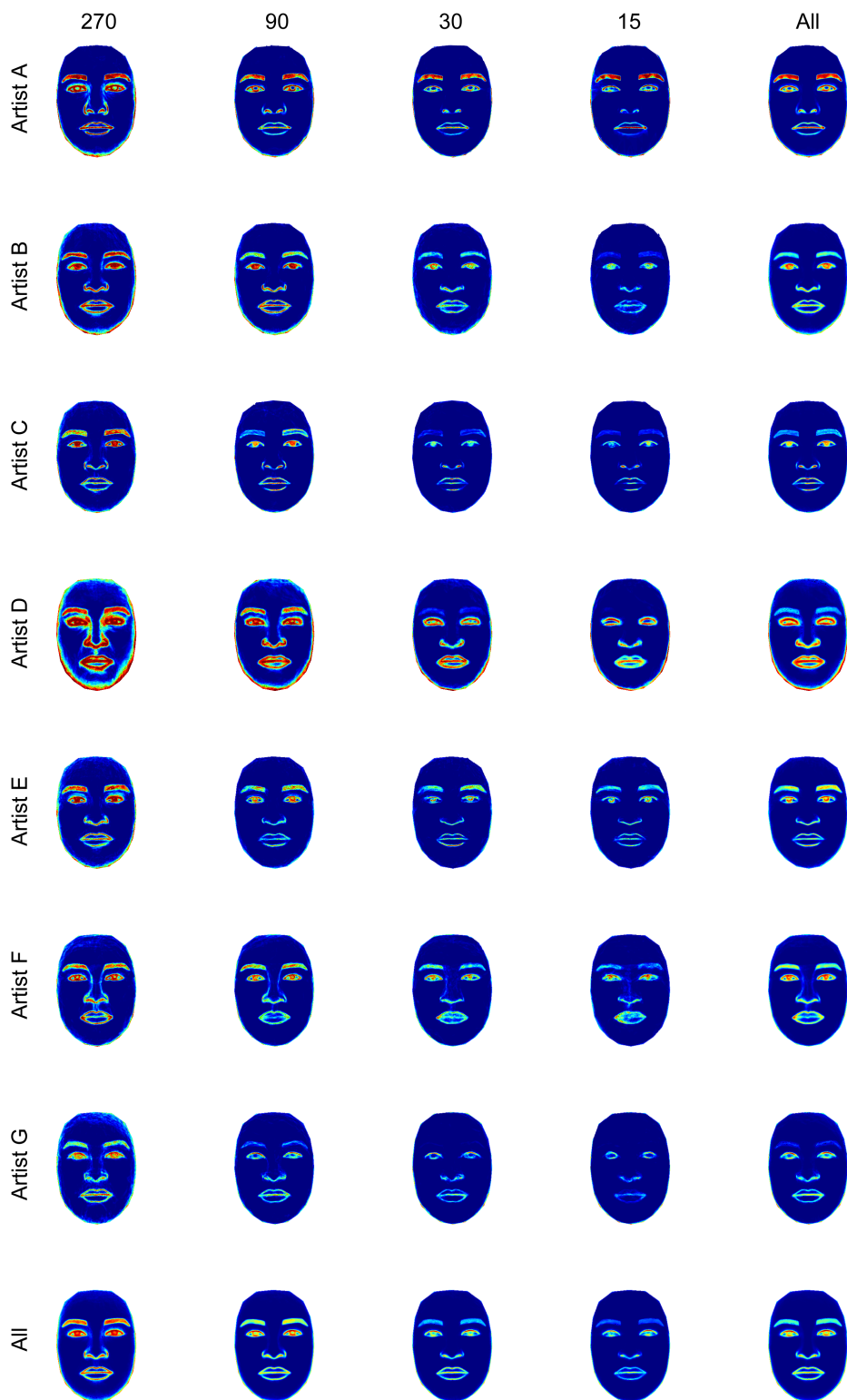
**Figure 10:** The variance of the offset vectors of each point for all 7 artists in each abstraction level: the higher the abstraction the larger the variance.



**Figure 11:** The results of deforming the mesh shape one standard deviation using our model with 3 PC's for each artist in each abstraction level.

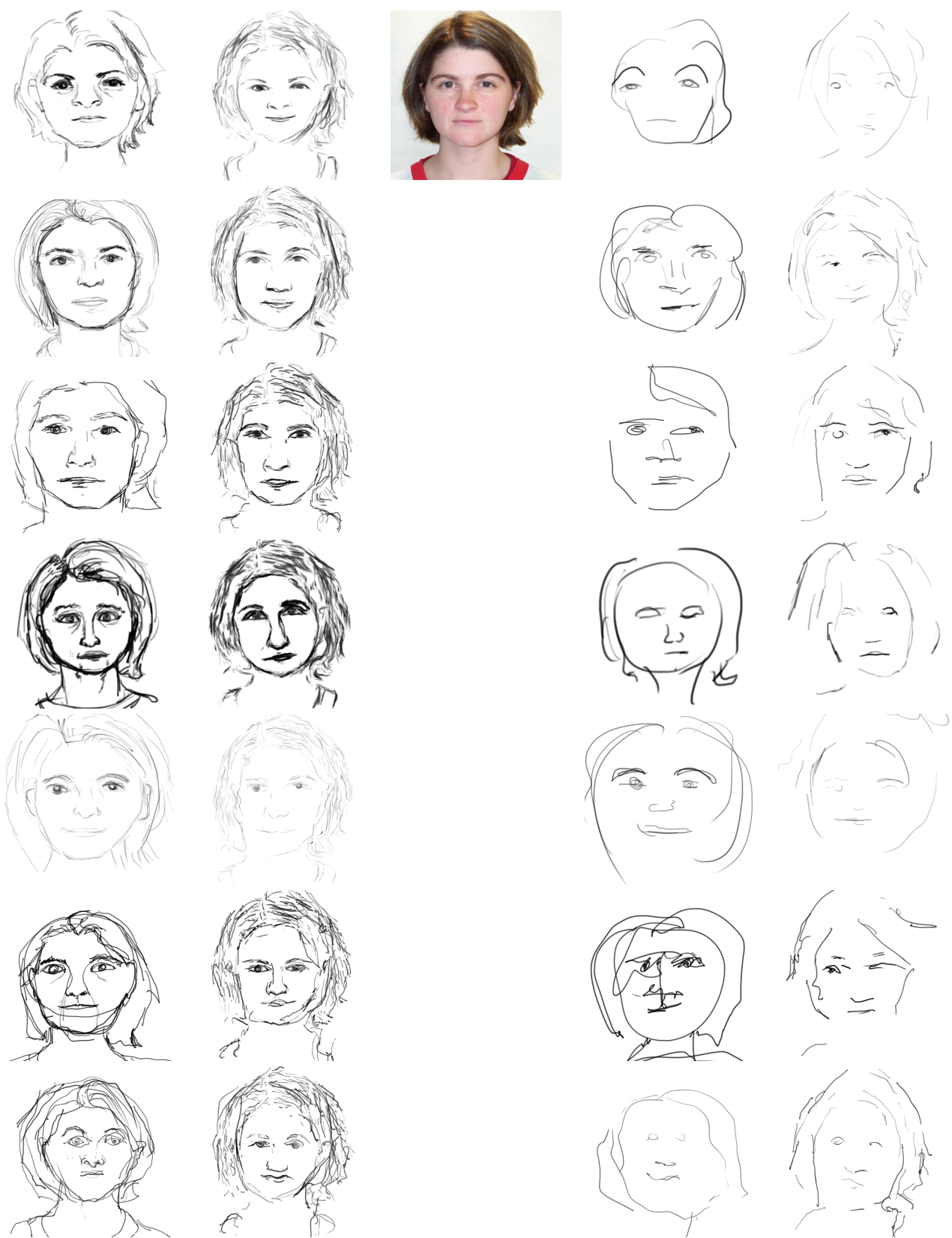


**Figure 12:** Average spatial distribution of strokes.



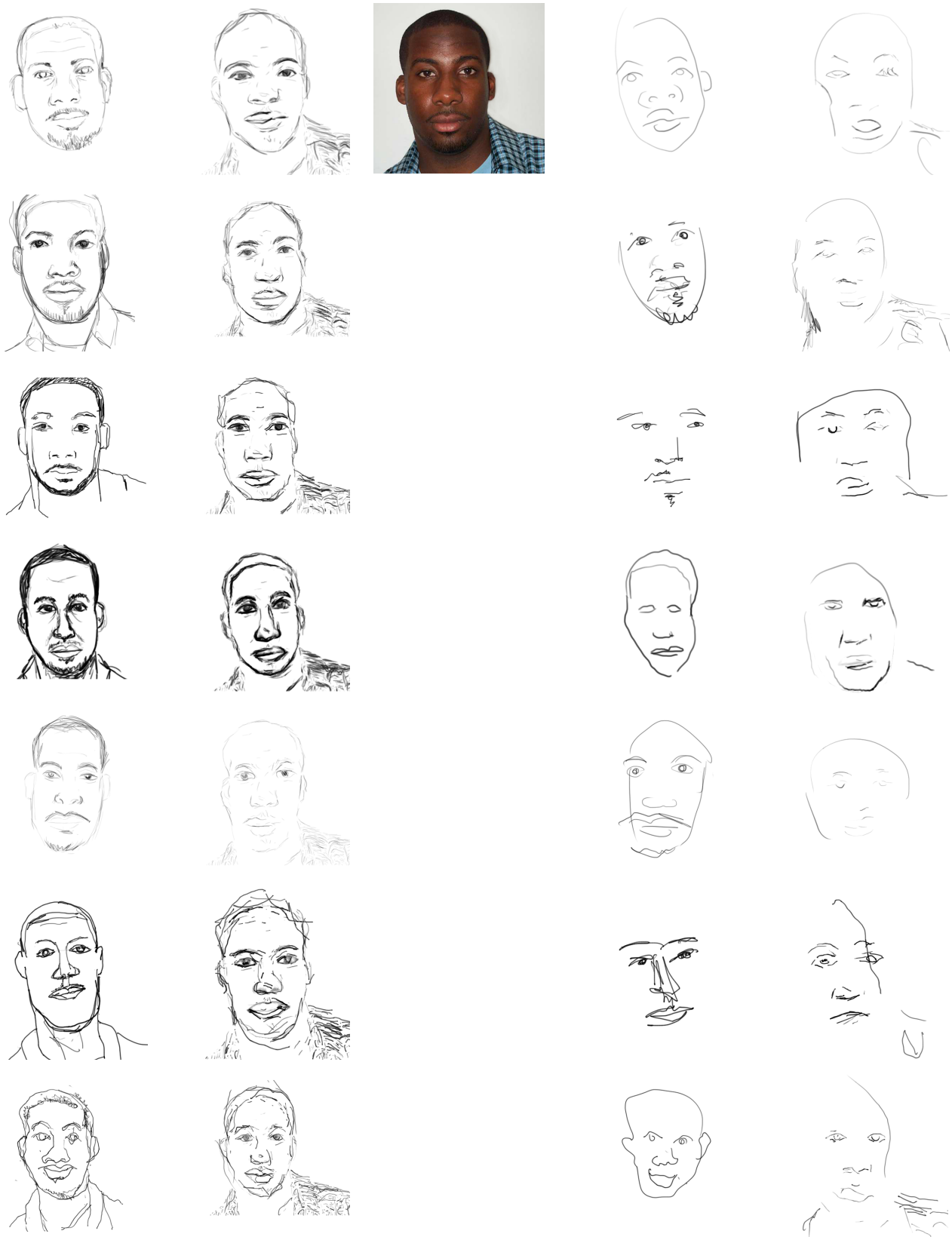
**Figure 13:** Average count distribution of strokes. We count how many strokes had been drawn on each position, without the strokes intensities. Abstraction can be seen more clearly this way (for example, we can see the lips become a single line, and the nose become more simplified).





**Figure 14:** More synthesis results: comparison of real and synthesized results of all styles (rows) and in two levels of abstraction (left and right) of a single woman model (shown at the top). The first and third columns are the real sketches of the artists at the least and most abstract levels, while the second and fourth are our corresponding synthesized results. Note how each artist has his/her own way of drawing the eyebrows, nose, and mouth.





**Figure 15:** Comparison of real and synthesized results of all styles (rows) and in two levels of abstraction (left and right) of a single man model (shown at the top). The first and third columns are the real sketches of the artists at the least and most abstract levels, while the second and fourth are our corresponding synthesized results. Note how each artist has his/her own way of drawing the eyebrows, nose, and mouth.