

# THE AFFECTIVE TONE OF LINES: EXPERIMENTAL RESEARCHES<sup>1</sup>

BY HELGE LUNDHOLM

Literature about Art very often gives us descriptions of masterpieces, wherein pure lines are characterized by adjectives that indicate a more or less emotional quality. Thus authors used to write about melancholy lines in paintings by Perugino, quiet lines in certain classical schools, violent lines in the baroque art, etc. Out of these facts there arises a problem. Is the affective character of the line a quality which is bound to the line itself, or is it suggested by the literary subject of the masterpiece? Furthermore, is this quality a phenomenon that appears equally to different observers? In order to throw light upon these questions, the following experiments were undertaken. The procedure was very simple. The persons who acted as subjects were asked to draw lines, each of which was to express the affective tone of an adjective given verbally. In the first series 48 adjectives, divided into 13 groups of synonyms, were used as follows:

- I. Sad, melancholy, mournful, doleful, sorrowful.
- II. Quiet, calm, tranquil, serene.
- III. Lazy, indolent, idle.
- IV. Merry, cheerful, gay, jolly, joyous.
- V. Agitating, exciting, sprightly, fiery, brisk, vivacious, lively.
- VI. Furious, angry, cross, vexed, enraged.
- VII. Dead, dull.
- VIII. Playful.
- IX. Weak, feeble, faint, delicate.
- X. Gentle, mild.
- XI. Hard, harsh, cruel.
- XII. Serious, solemn, grave, earnest.
- XIII. Powerful, forceful, strong.

<sup>1</sup> From the Psychological Laboratory of Harvard University, 1919-1920.

Two other series followed: the first of these was to find out if certain lines, so to speak, accord with certain colors; the second to learn what is characteristic of purely beautiful lines. The adjectives of these series were:

XIV. Red, blue.

XV. Beautiful, ugly.

Each line was drawn with a pencil on a sheet of white paper, 21 × 27 cm. in size. The greatest liberty was allowed the subjects even with regard to the time used in drawing the lines. The manner of moving the hand and pencil while drawing was carefully observed and described in each individual case. No record was taken either of the pressure of the pencil or of the time used in drawing each line. The series were repeated, the only change in the instruction being that the line should be drawn as rapidly as possible. The first and second line of each type were compared and if they differed the subject was requested to draw a new one, after which he decided which of the lines most satisfactorily expressed the purport of the adjective in question. It sometimes happened in the first series, that a subject drew several lines of one and the same type as if for trial. In those cases too they decided themselves which line satisfied them most fully. In tabulating the results only one line of each type was used and then always the one which had been judged most expressive.

The subjects were requested to express the adjective as far as possible by a pure line, not to symbolize sadness by the curve of a melancholy mouth or strength by a line suggesting the contour of a rock-formation, etc. Yet they were earnestly instructed to mention associations of this nature. Furthermore they were requested to describe the relation of every synonym to the first adjective in the group, in order that the experimenter might know what meaning the subject attached to the various adjectives. The introspection was carefully noted, and as far as possible verbatim. The sequence of the lines was such that two lines belonging to the same group never followed each other and were very seldom drawn in the same period.

The subjects were eight in number: four women, G, L, Mi, S; and four men, C, D, F and Ma. No one of them was either painter, or designer, nor did they know anything about the theories of the æsthetics of lines.

The experimentation took place from October 1919 to May 1920 in the Psychological Laboratory of Harvard University.

When the experiments were finished an examination of the results revealed certain principles by which the lines with a few exceptions could be classified. Thus they could first be separated into the following groups:

- I. Lines with only curves.
- II. Lines with only angles.
- III. Lines with both angles and curves.

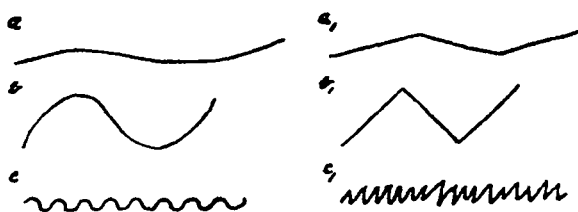


FIG. 1.

The first group (I) could in turn be divided into three subdivisions:

- (1) Lines with a few long and low waves (Fig. 1, *a*).
- (2) Lines with a few high waves of medium length (Fig. 1, *b*).
- (3) Lines with numerous small waves of varying shape (Fig. 1, *c*).

Correspondingly the second group (II) could be subdivided into:

- (1) Lines with a few obtuse angles (Fig. 1, *a*<sub>1</sub>).
- (2) Lines with a few approximate right angles (Fig. 1, *b*<sub>1</sub>).
- (3) Lines with numerous acute angles (Fig. 1, *c*<sub>1</sub>).

Finally the third group (III) could be subdivided according to the way in which waves of type *a*, *b*, and *c* were present in combination with angles of type *a*<sub>1</sub>, *b*<sub>1</sub>, and *c*<sub>1</sub>.

Another point of view from which the lines could be classified was that concerning their general direction. They

were supposed to be drawn horizontally from left to right in the largest dimension of the paper. Nevertheless in some of them there was a marked tendency to run upwards, in others a tendency to run downwards. These two together with the horizontal direction gives us three more groups.

It is self-evident that a classification of such a great number of lines as the experiments produced, must always be, to a certain extent, approximate. As has already been said the small waves were very often of a varying shape, and this variation grew still greater when they occurred in combination with angles. The latter in turn, especially acute angles, also showed very varying forms. Likewise there were found intermediate forms which were placed in the system according to the degree with which they approached the main types. It was easier to group those lines which had long and low waves and obtuse angles. Waves of type *a* very seldom occurred together with waves of type *c* in one and the same line. In a few cases waves of the latter type were found mixed with those of type *b*. In such cases the lines were placed within sub-group (2) or (3) according to the frequency of the different waves. Quite analogous was the situation regarding the occurrence of angles of the types  $a_1$ ,  $b_1$ , and  $c_1$ .

The long and low waves and the waves of medium length were very few in number in each line, as a rule there were only  $1\frac{1}{2}$  or 2 of them; while the small waves were numerous, in most cases 15 or 20. In the same way the obtuse and right angles always occurred less frequently than the acute ones. Sometimes small waves and acute angles were found as a secondary oscillation of a long wave or of a wave of medium length. This was often the case when the main direction of a line had an upward or downward tendency. Since in such cases the introspection did not attribute any other importance to the main wave than that of indicating upward or downward movement, these lines were always grouped under the type of small waves and acute angles.

On the following pages the lines are tabulated according to the two points of view mentioned. The headings of the

TABLE I.

	A			C			A and C						Di				
	B	M	S	B	M	S	A			C			H	U	D		
							B	M	S	B	M	S					
<b>I.</b>																	
(a) Sad.....				7	1										2		6
(b) Melancholy.				7	1										1		7
(c) Mournful....				6	1	1									1		7
(d) Doleful.....				5	1				1						1		6
(e) Sorrowful....				5		1											5
Total.....				32	4	2			1			1			5	1	33
<b>II.</b>																	
(a) Quiet.....				8											7		1
(b) Calm.....				8											5		3
(c) Tranquil....				8										1	6		1
(d) Serene.....				8											8		
Total....				32											26	1	5
<b>III.</b>																	
(a) Lazy.....				8											1		7
(b) Indolent....				7	1										3		5
(c) Idle.....				7										1	3		3 C°
Total.....				22	1										7	1	15
<b>IV.</b>																	
(a) Merry.....						6			2			2			4		4
(b) Cheerful....				2	1	3		1	1		1	1			3		5
(c) Gay.....					1	5		1	1		1	1			3		5
(d) Jolly.....					3	3			2			2			5		3
(e) Joyous.....				1	2	3			2			2			1		6
Total.....				3	7	20	1	1	8	2	8				16	23	1
<b>V.</b>																	
(a) Agitating...		3							5			5			4	2	2
(b) Exciting....				1		2			5			5			3		5
(c) Sprightly...						2			6			6			7		1
(d) Fiery.....		3							5			5			5		1
(e) Brisk.....		2						1	5		1	5			4		4
(f) Vivacious...					1				6		1	5			2		6
(g) Lively.....									7		1	6			4		3
Total.....		8		1	1	4		1	39	3	37				29	23	4
<b>VI.</b>																	
(a) Furious.....			2						6		1	5		4	3		1
(b) Angry.....			1						6			6		4	2		1 S
(c) Cross.....			2	1					4		1	3		3	2		2 G°
(d) Vexed.....			2				1	1	4		1	5		3	4		
(e) Enraged....			1			1			5			5		3	4		1 D
Total.....			8	1		1	1	1	25		3	24		17	15		5

	A			C			A and C						Di			
	B	M	S	B	M	S	A			C			H	U	D	
							B	M	S	B	M	S				
VII.																
(a) Dead.....		1		5									7		1 D.L.	
(b) Dull.....	1			6									5		3 D.	
Total.....	1	1		11									12		4	
VIII.																
(a) Playful.....					1	2			4			4	3	4	1 S	
IX.																
(a) Weak.....				4		4							3		5	
(b) Feeble.....				3									3	1	4 Mi, L, C, G, Ma.	
(c) Faint.....				5	1								3		5 S.F.	
(d) Delicate....				1	1	4			1			1	5	2	1 Ma.	
Total.....				13	2	8			1			1	14	3	15	
X.																
(a) Gentle.....				7		1							5		3	
(b) Mild.....				5	1	1							7		1 Ma	
Total.....				12	1	2							12		4	
XI.																
(a) Hard.....	1	5	2										6	1	1	
(b) Harsh.....			4						4		1	3	3	1	2 Ma, S.	
(c) Cruel.....		1	5		1				1			1	4	2	2	
Total.....	1	6	11		1				5		1	4	13	4	5	
XII.																
(a) Serious.....				5	3								4	1	3	
(b) Solemn.....				6		1							5		3 Ma	
(c) Grave.....				6	2								3	1	4	
(d) Earnest.....				5	1								4	4	4 S Ma	
Total.....				22	6	1							12	6	14	
XIII.																
(a) Powerful....		1		3	4								5	3		
(b) Forceful....	1	2	1	2	1				1			1	3	4	1	
(c) Strong.....		2		1	4	1							1	5	2	
Total.....	1	5	1	6	9	1			1			1	9	12	3	

columns mean: (*A*) angles, and (*C*) curves, (*B*), (*M*), and (*S*), big, medium, small, referring respectively to waves of the types Fig. 1, *a*, *b*, and *c*, and angles of the types Fig. 1, *a*<sub>1</sub>, *b*<sub>1</sub>, and *c*<sub>1</sub>. (*Di*) means chief direction, (*H*), (*U*), and (*D*), horizontal, upward tendency and downward tendency. On

the right side of each table are indicated lines which for one reason or another are outside of the groups. The letters at the right indicate the subjects who draw those unclassified lines, while the horizontal line in which they stand indicate the type of the line (sad, joyous, etc.). A letter with index  $^{\circ}$  means that the line was not drawn by the subject.

Table II. shows how the lines are divided if each group of synonyms is taken as a whole. The numbers are reduced to a per cent. of the total number, within the group.

TABLE II.

	A			C			A and C						Di			
	B	M	S	B	M	S	A			C			H	U	D	
							B	M	S	B	M	S				
I. Sad, etc. ....				82	10	5			3			3	13	3	84	
II. Quiet, etc. ....				100									81	3	16	
III. Lazy, etc. ....				92									29	4	63	4
IV. Merry, etc. ....				8.4	18	50	2	2	20		4	20	40	58	2	
V. Agitating, etc. ....			14	2	2	7			70		5	67	52	41	7	3
VI. Furious, etc. ....			21	2.5		2.5	2.5	2.5	64		8	61	44	38	13	5
VII. Dead, etc. ....	6	6		69									75		25	19
VIII. Playful, etc. ....					13	26			50			50	38	50	12	11
IX. Weak, etc. ....				41	6	25			3			3	44	9	47	25
X. Gentle, etc. ....				75	6	13							75		25	6
XI. Hard, etc. ....	4	25	46		4				21		4	17	54	17	21	8
XII. Serious, etc. ....				69	19	3							38	18	44	9
XIII. Powerful, etc. ....	4	21	4	25	38	4			4			4	37	50	13	

If, to begin with, we look over the first six groups in the tables we find that in group I.-III. (sad, quiet, lazy, etc.) most of the lines show curves of type *a*, i.e., 82 per cent., 100 per cent. and 92 per cent., while the number of lines drawn with small curves, and with angles and curves is very inconsiderable. In the groups IV.-VI. (merry, agitating, furious, etc.), which contain adjectives indicating to a certain extent opposite mental states, the contrary is true, that is, a very great number of lines show short waves and acute angles while waves of types *a* and *b*, and angles of  $a_1$  and  $b_1$ , are a decided minority. It is also striking that in Group IV. (merry, etc.) lines with only short waves of type *c* predominate and that in Group V. (agitating, etc.) we meet for the first time lines with only angles, and those all of type  $c_1$ .

Hence we find a relative uniformity in the lines belonging to groups I.-III. (sad, quiet, lazy, etc.) as well as a certain uniformity in the lines of groups IV.-VI. (merry, agitating, furious, etc.). If we compare these facts with the qualities suggested by the corresponding adjectives we find that all those adjectives indicating a state of mind of little motor expression (groups I.-III.) have been symbolized by lines consisting chiefly of long and low waves, while those which indicate states of strong motor expression have been symbolized by lines of either short waves alone, or acute angles alone, or of both. This result can be illustrated by the following formula, in which  $m$  means states of mind with little,  $M$  with strong, motor expression and the other letters refer to the different types of waves and angles already described.

$$\text{I. } m = a \qquad \text{II. } M = \begin{cases} c \\ c_1 \\ c + c_1 \end{cases}$$

It has long been known that pure lines in themselves are able to suggest movements or motor states. Consequently the question arises whether there is a law for these phenomena; that is, whether certain lines suggest movement in a higher degree than others. An answer to this question was obtained by the following simple experiments. Each of the subjects was asked to draw four wave lines suggesting movements of different degrees of intensity.<sup>1</sup> They all drew them alike. The line of least movement had long waves of type  $a$ , the next had shorter waves, and compared with the length, higher waves, the third had still shorter waves and the fourth small waves of about the same type as  $c$ . It is to be remarked that in the last line the waves were frequently sharpened and approached acute angles. These experiments show, undoubtedly, that long and low waves suggest less movement than shorter and higher ones, and furthermore that the movement suggested by a line becomes accentuated if this contains acute angles. Several introspective statements of the subjects verify these results. A few of them follow:

<sup>1</sup> By intensity is meant both rapidity and the force which is read into the line.



*G:* There is often much movement in an angular line but this movement is of a jagged, broken, and hard character.

*L:* Small waves make the movement of a line go more quickly. The calm line has slow, long curves.

*Mi:* Sharp angles give a sensation of speed—much action. Broad curves represent more enduring emotions, while the small curves show more transitory and volatile emotions. They are more rapid.

*C:* Angularity of a line expresses violence of movement. If a curve is slowly undulating or sweeping it is soft. To be so, it must have long waves with low amplitude. Angles and straight lines always express violence, energy of movement. A long curve always expresses slowness.

*F:* Angles, especially the sharp ones, express vivacity. Short curves imply vivacity.

Many more statements of the same nature could be quoted, but those already chosen are sufficient, especially since there is not a single contradiction.

Hence we see first that lines symbolizing states of strong motor expression have short waves and acute angles and lines symbolizing states of weak motor expression have long and low waves; and second that lines with waves of the former type and acute angles themselves suggest intense motion, while lines with waves of the latter type suggest weak and slow motion. This justifies us in supposing that the affective character of lines has its origin in the suggestion of movement of the line that it depends upon the idea that this movement in some way imitates the motor expression of an emotion. This supposition becomes greatly strengthened by the fact that the subjects themselves have mentioned the movement as being of importance for the emotional expression of the lines.

How the illusion of movement itself in the pure line arises, is another problem which has been treated to a great extent in psychological literature. The only light that was thrown upon the theory of the phenomenon by the subjects was, that three of them agreed in explaining that the suggestion of movement of lines was connected with an idea of the motion of the hand in drawing them. One of the subjects connected the phenomenon with the movement of the eye in following the line; the rest did not express any opinion.

If we compare groups IV. (merry, etc.) and VI. (furious,

etc.) in the tables, we find that in the former 50 per cent. of the lines show only small waves, and 20 per cent. show small waves and acute angles, while in the latter only 2.5 per cent. show small waves, and 64 per cent. small waves and acute angles. There is an obvious difference between the two groups, although both of their adjectives indicate states of strong motor expression. We obtain the explanation of this, however, if we examine the general introspective statements regarding the feeling tone of curves and angles, which were given during the progress of the experiments. A complete and systematical quotation of them follows:

*G:* Sharp angles are unpleasant—weakness can never be expressed through angles. The rapid interruption through angles gives the impression of fury. Angularity of a line suggests sharpness, impatience, hard-heartedness, a certain unfeeling vigor and strength. Likewise angularity implies absence of gentleness and grace. Very little refinement can be suggested by it. There is often very much movement in it, but of a jagged, broken and hard sort. It lacks high purposes; it is an unstudied line of least resistance.

Curves suggest grace, serenity and most of those physical and mental qualities acquired in civilization and education. The curving of a line gives it more maturity, it gives the poise and refinement of nature. It does not lack strength, it always expresses a high and rather moral quality of a feeling.

*L:* Sharp angles hurt. Angularity expresses the hard, angry, and unpleasant emotions. It indicates fire, storm, strength and power.

Curves denote grace and beauty, serenity and kindness. The finer characteristics of all elements are shown by curves. Big curves express heaviness, firmness and strength.

*Mi:* Small angles are cruel because they remind one of stabbing points. Angularity of a line usually expresses ungracefulness, too much expenditure of energy for the execution of the intended movement. Much action. Suggests the emotion of anger, fear, surprise, excitement, all emotions which are sudden and immediate. Also expresses pain, anguish, brutality and sharpness. Obtuse angles represent emotions of a slower, less emphatic sort; sharp angles give a sensation of speed and deeper excitement and a higher point of emotional instability.

A curving line usually represents grace and economy of movement. It is pleasanter than an angular line, because it does not take so much trouble to follow it. It suggests gentle emotions, such as pleasure, happiness, gaiety, and the opposite sorrow and grief. Broad curves are more graceful than small curves and represent more enduring emotions, while the small curves show more transitory and volatile emotions. Power is expressed in big curves, even dignity.

*S:* Angularity means awkwardness and hardness, lack of gracefulness in the movement. I do not think a right angle could ever be soft. Could not connect an angular line with gentleness, because it is hard and sharp.

Curving of a line means sweeping motion. Anything curved, going very slowly, is mild.

*C:* Angles give the idea of violence and vivaciousness; they imply viciousness, anger, etc. There is a correlation between straight lines and angles, and hardness.

A long curve always expresses smoothness and slowness. Lines curving upwards express increase of *tonus*, lines curving downwards express relaxation—sometimes depression. A curve is soft if it has long, low waves which undulate in a smooth way.

*D:* Harshness must always be expressed with angles. The weak line has not energy enough to make angles. Angles express the absence of conscious idea. Angles in a line imply the more abrupt and violent emotional states. They represent feelings that are more or less spasmodic in expression with no special inhibition of a tendency towards marked accent. Angles are harsh and consequently striking. Angles, on the whole, express the more intense, elementary feelings.

In contrast to angles, curves in a line usually represent the more refined and purely intellectual feelings. They tend to modify and control even the most violent of emotional states and consequently are usually the more pleasing of the two. Curves also tend towards a more intimate coordination between the different elements expressed in a feeling state; and hence aid in uniform and consistent expression of any particular state or states. Curves appeal to the finer and more highly differentiated aspect of the subject.

*F:* Angular motion represents hard and painful feelings. Angles even tend to express strength, vivacity—sharp angles, distress; broader angles, power, determination, calmness.

Curves express grace and are usually pleasant. Short curves, grace and liveliness; long curves, beauty, indolence, calmness. Curves in general express the weaker and less forceful emotions.

*Ma:* Sharp angles imply the idea of pain, pricking pain, spitefulness, incongruity, instability, moodiness. Angles even imply sharpness and sudden transition, brusqueness, caustic feeling, quick temper, ugliness.

Curves imply gradual transition, the more subtle emotions, prettiness, lack of much strength, smoothness.

With the above-quoted introspection as a back-ground we can easily understand the difference in character of the lines belonging to groups IV. (merry, etc.) and VI. (furious, etc.); it is the general pleasantness of the emotions in the former group which has caused the subjects to symbolize these emotions with chiefly curved lines, while it is the unpleasant and unrefined feeling tone of the emotions in the latter group, that underlies the use of so many angles in its lines. We can likewise understand the distribution of angles and curves in groups IX. (weak, etc.) and X. (gentle, etc.) on one hand and in group XI. (hard, etc.) on the other. In the first two of these groups the curves are in a decided majority (72 per cent. and 94 per cent.) and in the latter the angles (75 per cent.) and the angles and curves (21 per cent.). The reason for the long and low waves predominating in

groups IX. and X. is without doubt that the state indicated has a weak motor expression, while the reason for the predominance of acute angles in group XI. is due to the more painful feeling tone connected with the character of the states expressed through its adjectives.

If we compare groups IX. (weak, etc.) and XIII. (powerful, etc.) which are opposite in regard to the meaning of their adjectives, it will be noticed that in the former, curves of type *b* are in a decided minority while in the latter, the same curves together with angles of type *b*<sub>1</sub> tend to predominate. These groups consequently show first in a negative and secondly in a positive sense, that high curves of medium length are the ones which above others suggest strength. Group XIII. also seems to imply that the right angles of type *b*<sub>1</sub> possess the same quality. A few introspective statements already quoted in another connection verify this.

*L*: Big curves express graveness, firmness, and strength.

*Mi*: Power is expressed in big curves, even dignity.

*S*: I do not think a right angle could ever be soft.

*F*: Broader (in opposition to sharp) angles represent power.

Finally if we examine those groups not yet treated, VII. (dead, etc.) VIII. (playful) and XII. (serious, etc.), we can easily interpret their lines from the points of view which we have already gained. VII. and XII. contain chiefly waves of type *a* (69 per cent. and 69 per cent.), obviously depending upon the inactive character of their adjectives; VIII., on the other hand, the more active group, contains chiefly waves and angles of types *c* and *c*<sub>1</sub> (50 per cent.) or waves of type *c* only (26 per cent.). Perhaps we should have expected the last number to be a little larger considering the pleasant feeling tone of the state.

Those lines which differ too widely from our categories to be subordinated to any one of them, show few traits of interest. As a rule their shapes have been fixed by one or another concrete association. In only a few cases can the deviating lines be said to form a category of their own, as for instance in group VII. (dead, etc.), where they are all horizontal straight lines, or in group IX. (weak, etc.), where a common

quality in seven of them is that they are each drawn with a consciously trembling hand. The association lying behind this is too obvious to need any description. That straight horizontal lines have been used as symbols for death and dullness has, according to the statements of the subjects themselves, its cause in their lack of motion.

Before we proceed further it might be useful to incorporate some of the new results in the formulæ which we have already drawn up. This can be done by dividing the second of them into two new ones. Thus:

$$\text{III.} \quad Mp = \begin{cases} c \\ c_1 \\ c + c_1 \end{cases} \quad c > c_1$$

$$Mu = \begin{cases} c \\ c_1 \\ c + c_1 \end{cases} \quad c_1 > c$$

$Mp$  means an emotion with strong motor expression and pleasant feeling tone.  $Mu$  an emotion with strong motor expression and unpleasant feeling tone.  $>$  means more frequent than.

As already stated, the lines could also be divided into groups according to their chief direction, which is recorded in the last columns of the tables. In regard to these also, general tendencies can be established.

If we begin by giving our attention to groups I. (sad, etc.) and IV. (merry, etc.) we find that in the former 13 per cent. of the lines are horizontal, 3 per cent. inclining upwards and 84 per cent. inclining downwards, while in the latter 40 per cent. are horizontal, 58 per cent. inclining upwards and only 2 per cent. inclining downwards. The explanation is given by the introspection of the subjects, in the following statements:

The downward tendency of a line expresses relaxation, the upward expresses power. The downward tendency expresses faintness, not sufficient strength to keep up. Going downwards expresses losing of energy. The doleful line droops without energy. If it had force it would have ascended

higher. Strength is expressed by going upwards. A joyous line also ascends. Joy is an uplifting feeling. A forceful line tends upwards. Thereby it obtains the idea of ambition. A line indicating strength is a line tending upwards, never downwards.

On not less than 57 different occasions analogous statements have been noted, and not a single one shows a tendency towards an opposite opinion.

Therefore it seems to be obvious that even the direction of the lines to a certain extent imitates the motor expression of an emotional state and that consequently the direction is one of the factors that partakes in giving them their affective tone. Direction upwards expresses strength, energy, force, ambition, uplifting feelings, etc., direction downwards, weakness, lack of energy, relaxation, depression, etc.

If we look over the different groups with attention to their chief direction, this is verified. In the groups IV., V., VI., VIII. and XIII. containing synonyms for merry, agitating, furious, playful, and powerful we find more upward than downward tending lines, while in I., II., III., VII., IX., X., XI. and XII. groups, containing synonyms for sad, quiet, lazy, dead, weak, gentle, hard, and serious, a larger number of lines tends downwards than upwards. All these facts correspond to the general differences in the emotional states so far as the qualities just mentioned are concerned.

It is interesting to note that in group II. (quiet and its synonyms) namely the indifferent group, the largest per cent. (81 per cent.) of the lines tends towards the horizontal. Why group XI. (hard and its synonyms) has more downward than upward-tending lines can not be explained through the introspection directly. The differences in per cent. (21 per cent. to 17 per cent.) is small enough, however, to make it possible that it may be due to chance.

The experiments were not carried on in such a way that they gave exact records either of the fashion in which the lines were drawn, or the time used in drawing them. Investigations concerning these could be undertaken and should give interesting results. Judging from the observations made

by the experimenter a tendency seems to exist to draw the more rapidly, the stronger the motor expression of the state of mind to be symbolized is. Thus as a rule the joyous lines were drawn much more rapidly than the sad ones. Likewise the small waves and the acute angles were generally drawn more rapidly than the big waves and the broad angles. There were exceptions, as for instance when cheerfulness was expressed through one single big upward-going half wave, drawn with great rapidity, or when excitement was expressed in an analogous way. Even the thickness of the line and the pressure of the pencil seemed to follow certain rules. Strength was very often expressed by a homogeneous thickness of the line caused by a strong continuous pressure of the hand when drawing. We have several similar introspective statements. Breadth of a line gives the impression of strength. It expresses intensity, strength and great saturation.

On the contrary, lines belonging to the group of "weak" and its synonyms are drawn as a rule so thinly that at times they can hardly be seen. One of the subjects even defined a weak line as a line that "you hardly can see." Such observations indicate that further experiments aiming to record the rate and manner of drawing the lines would be worth while.

As has already been said, the subjects were requested to avoid concrete associations as much as possible, but at the same time to mention if they happened to appear. Few associations have been noted. This, however, does not exclude the fact that such did influence unconsciously the shape of the lines, and their feeling-tone. The following is a complete record of all associations written down in the subjects' own words:

*G:* Sad: drooping lips, gloomy valley pits. Indolent: picturesque laziness of southern people, vagabond. Merry: childish quality, like jumping. Jolly: like a kitten. Joyous: bumping movement like a ball; a boy turning somersaults. Vivacious: harlequin. Fiery: dragon. Playful: a cat playing with a ball. Hard: undecorated wall. Strengthful: pyramids and mountains.

*L:* Cheerful: something rippling. Joyous: dancing. Furious: sharp points that hurt.

*Mi:* Merry: the country, jumping. Fiery: flames in a fire. Weak: a weak chin. Hard: saw teeth. Powerful: buildings and big waves.

*S:* Melancholy: a weeping willow tree. Doleful: a doleful face. Merry: making noise. Joyous: child clapping its hands.

*C:* Indolent: a yawn. Merry: dance. Furious: lightning; musical associations. Sprightly: movements of a danseuse.

*D:* Fiery: lightning.

*F:* Idle: idea of walking around. Vexed: angles represent a hard and painful feeling.

*Ma:* Sad: a man suddenly starting up and then relaxing. Lazy: the general outline of a slope. Idle: a man doing nothing. Merry: turning round, jumping. Cheerful: dancing. Dull: a dull knife. Weak: a weak mouth. Hard: the rock of Gibraltar. Serene: the idea of thought. Serious: sort of a brain wave.

The few investigations made in order to find out whether pure color-images could be symbolized with lines show that it is chiefly the exciting and quieting elements in the colors which induce the shape of the lines. The different types of lines which we have separated are divided in the following way:

Red:  $c_1 = 3, a = 1, c = 1, c + c_1 = 2$

$H = 2, U = 2, D = 2.$

Blue:  $a = 5, b = 2.$

$H = 7.$

In the red lines we see that the small waves and acute angles are in the majority; in the blue the big and low waves. Regarding direction, all the blue lines are horizontal like the lines of group II (quiet and its synonyms). In the red lines the different directions occur in equal numbers. The introspection of the subjects gives a key to the explanation of the lines.

*G:* The red line is the line of gaiety, of warfare. A cruel line.

*L:* Red line like the furious and the fiery.

*S:* Red line like fire.

*D:* Red line like anger.

*F:* Red line fiery.

*Ma:* Red implies great intensity, energy, and saturation.

*G:* The blue line is gentle, placid, and calm.

*L:* Blue line is serene like quiet water.

*S:* Association from the quieting blue sky.

*D:* Blue line is sad.

*F:* Blue line is calm and faint.

In some cases no introspection was given by the subjects. There is a certain interest in observing that with the color lines concrete associations seem to have been more lively



than with the other lines. If we connect the facts noted with our previous results it is quite obvious that the red line is the active and energetic type, while the blue is quiet.

The material gained from the drawing of beautiful and ugly lines can not be classified according to our previous basis of separation. The types of lines are too varied. The introspection, nevertheless, hints at general tendencies in drawing those lines.

#### BEAUTIFUL

*G:* Gradual curves. The line gives what is expected. No interruptions in it. A beautiful line is always symmetrical. There is a dignified quality in the beautiful line. It is smooth.

*L:* Graceful movement is connected with a beautiful line. It glides along and is always made up of curves. Association: waves of the sea.

*Mi:* A beautiful line has continuity and is not crossed by any other line. Association: a swan.

*S:* A circle is a beautiful line. It is satisfactory because it is symmetrical and curved.

*C:* A beautiful line swings smoothly and is round and curved. All the curves have the same form. Smoothness and roundness are necessary for a beautiful line.

*D:* A beautiful line has a harmonious fusion of its different parts. It has a certain symmetry and very little conflict. It expresses a single and harmoniously blended idea.

*F:* A beautiful line is symmetrical, smooth and round.

*Ma:* Gradual transition is necessary in a beautiful line. It cannot have any straight parts. It is sweeping.

#### UGLY

*G:* The ugly line is just like a mass. Curves, angles and straight parts are mixed together, without organization. You get ready for a curve and then you have something else. Constant changes from unpleasant to more unpleasant.

*L:* An ugly line must have angles.

*Mi:* An ugly line has no continuity. Straight lines, curves and angles are mixed up.

*S:* The ugly line goes nowhere. Has no feeling.

*C:* The ugly line is a sort of conglomeration; is meaningless and broken up. It is like a mass. No uniformity in the curving. The intersections make the line ugly.

*D:* Ugly lines have no unity, no harmonious fusion between curves, straight lines, and angles. A conflict of different emotions is caused thereby. The curved line has one feeling-tone, the angles another, and the straight parts a third. Even a conflict of movements.

*F:* The ugly line is asymmetrical and has angles.

*Ma:* In ugly lines there is a conflict between different parts. The unrelated spaces make the line ugly.

We can easily deduce from these introspective statements that certain qualities are necessary in a line in order that it will appeal to us, and that the absence of these qualities makes

the line ugly. The chief criteria of a beautiful line seem to be the following: unity in direction and movement, continuity, absence of angles and intersections, a periodical return of the same elements or a certain symmetry.

#### SUMMARY

A résumé of the chief results regarding the affective tone of lines gained through the experiments can be formulated in the following sentences.

There seems to be a feeling tone connected with pure lines, which is perceived by a majority of observers.

This feeling tone is probably dependent upon the suggestion of movement in the lines; that is, the lines appear to imitate in their movement the motor expression of emotional states.

Slow and weak movement is suggested by lines with long and low waves, rapid and intense movement by lines with small waves and acute angles.

Consequently, emotions with little motor expression are suggested by lines of the former type and emotions with strong motor expression by lines of the latter.

A finer differentiation of the emotions suggested is not possible. Sad, lazy and quiet lines have practically the same shapes; likewise the furious and exciting are similar.

When sharp angles predominate in a line of the active type, it seems to acquire an unpleasant feeling tone, as well as an increased intensity in its movements. Thus, a jolly and a furious line differ in the frequency of the acute angles.

Strength is very often expressed by big and high waves; and even by right angles at times.

Broadness of a line indicates strength, while thinness indicates weakness and faintness.

Beauty in a pure line is expressed by unity of direction, continuity, roundness of curves, lack of angles, and periodical repetition of similar elements, or by a certain symmetry; ugliness by the reverse of all these qualities.

With these facts in mind we can understand why pure lines are an emotional factor in art and why they are an important factor in our enjoyment of the great masterpieces.