DISCRIMINATIVE REACTIVITY ON A COLOUR ARRANGEMENT TASK OF FINE ARTS STUDENTS AND AUTOGENIC TRAINEES

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ABSTRACT

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The Colour Pyramid Test (CPT) was given to 125Ss: 8 matched groups of Fine Arts Students, Autogenic Trainees and non-specific control groups; before and after 8, 12, 16 weeks to verify a person's discriminative reactivity in selecting "pleasant" and "unpleasant" chromatic and achromatic stimuli and the changes occurring over time and between groups during the course of studies in Art and during the regular practice of Autogenic Standard Exercises which are unrelated to colour perception.

It was observed that consistency in choices was rare throughout groups therefore indicating a fluctuating and individualistic phenomenon. However, some colour choices were significant and exhibiting trends as groups. Artist groups show a significant opinion as to what they judge a "pleasant" colour and chose a wider range of colours but they show less stability in discriminating between pleasantness and unpleasantness in a colour. Ss practicing Autogenic Training appear to have a higher degree of discriminative reactivity as far as pretty and ugly colours were chosen. Autogenic Groups have a tendency to increase their choices of yellow and bright red as pretty colours and decrease their preference for black over time. There is a general agreement in the choice of yellow and bright green as a pleasant colour and black and brown as unpleasant colours. In general, "pleasantness" is associated with lightness and "unpleasantness" with dark colour values. Groups have shown a greater agreement as to what constitutes an ugly colour.

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Introduction

Colour is one of the fundamental elements through which we find out about things; it is an essential part of our light sense and as important to our existence and survival as our sense of sound, touch, taste and smell. "Color is not purely physical, purely chemical, purely psychological. The problem is one of perception... depending on the eye and the brain". (Wyszecki 1972). Everyone of us has a deep experience with colour perception and yet only a few, if any, can claim an intimate knowledge of this multifaceted phenomenon that governs our perception of colour. Interest in colour perception is widespread and diverse, and different points of view and disciplines have inspired poets as well as scientists. Brain programming in regard to colour, i.e. how the brain mechanisms react or operate in regard to colour perception has been the object of several psychophysiological studies (Brown 1971, Luthe and Schultz 1969, Luthe 1970, Swimm 1966, Gerard 1959).

This exploratory study springs from an interest in these manifestations of the brain (visual elaborations -structural dynamic, chromatic) as it was observed in trainees practicing autogenic (Luthe 1970) and the effects it has on the reality of the visual world. To be more specific, the discrepency existing between

the visual experimentation with colour as pigment, as colour surface and colour field, as colour-light in an art producing environment and the visual experience of the spontaneous vision of colour belonging to an abstracted and introspective way of seeing, during the practice of autogenic methods yields interesting perspectives and information leading to a better comprehension of the psychophysiological and artistic processes of colour experience.

Colour as an internal concept or an external symbol in a work of art is related to emotions, affect and mood-states (Schaie, Heiss 1964). It has been a source of preoccupation for artists, art therapists, art educators, clinicians and others involved in color knowledge, and more information on the reaction of humans to color bring new directions or confirmations of this knowledge.

Chapter One

Objectives

This research deals with the reactivity and choices of colour made, when 24 colour stimuli (Color Pyramid Test) is given to Ss who are practicing autogenic standard exercises, student-artists who are training in the same Fine Arts program and Ss who are experiencing colour but who do not make colour an object of special consideration.

Method: It was of interest to verify quantitatively the reactivity of these matched groups as they were presented with the task of making a "pleasant" (pretty) and an "unpleasant" (ugly) colour choice arranging them into a pyramid form of 15 squares. In the Color Pyramid Test protocole, the word "pleasant/pretty" and "unpleasant/ugly" are used to stimulate positive or negative feelings.

Colour experienced with autogenic methods is of a psychophysiological brain-directed nature; it is an "unseen" colour in reality, and belongs to an abstrated or introspective way of seeing. Luthe (1969) defines the term "autogenic" (self-generating) from a psychophysiological point of view characterizing "the

implications resulting from a self-induced psycho-physiologic shift to a specific state (autogenic-state) which facilitates autogenic (brain-directed, self-generating, self-regulatory) processes of a self-normalizing nature. In other words, Autogenic Training and related autogenic approaches are designed to promote and to give specifically adapted support to those brain-directed self-regulatory (autogenic) mechanisms which normally participate in homeostatic, recuperative and self-normalizing processes".

The psychophysiological shift (Umschaltung) from a normal state to the autogenic state facilitates and mobilizes self-normalizing brain mechanisms which otherwise remain inhibited. Structural, dynamic and chromatic discharges increase in diversity, reality, brightness and chromatic differenciation through regular practice of autogenic methods. Here, we are particularly concerned with the practice of one of six approaches: Autogenic Standard Exercises. The autogenic state is reached by passive concentration (*) on physiologically adapted verbal stimuli, i.e. autogenic formula, not related to colour

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(*) "Passive concentration implies a casual attitude and functional passivity towards the intended outcome of the trainee's concentrative activity" (Luthe, Vol.I, p.232, 1969).

(heaviness, warmth, cardiac regulation, respiration, abdominal warmth, cooling of forehead). Colours experienced in this state could be related to, but are not necessarily of, the same nature as experienced in dreams, under anesthetics, after hallucinogenic drugs, or during various forms of meditation.
In certain respect, the inner visual colour field appears different in quality and chroma than the one found in colour surface or colour field experienced in a normal visual state. Seemingly, these trainees report a very personal emotional response to colour as the brain presents it to them. It has been known to stimulate their creative productions in different disciplines and artists have observed a change in style and in the quality of their work, as result of this experience (Luthe, Vol.III, 1969).

On the other hand, Fine Arts students arrive at a colour knowledge, intuitively, by chance or through the regular use of colour in their work and the gradual development of their experience with this element. However, a student attending a Fine Arts programme generally goes beyond this intuitive and groping approach as he is confronted with problem-solving situations presented by his instructor or himself. He learns about chromatic differentiation by an "active modality of concentration" and application of principles of colour

mixture, harmony and variation, balance, contrast, forms, design, expression and impressions (Feldman 1970, Birren 1969, Chapanis 1965, De Sausmarez 1964, Itten 1964, Albers 1962, Anderson 1961, Goldstein and Goldstein 1954, Sargent 1923). The student in art may conduct his aesthetic research and creative development from colour systems based on physical, chemical, physiological and technological theories on colour (Motokawa 1970, Ostwald 1969, Munsell 1969, Fer 1963, Teevan 1961, Jacobson 1948). Or for that matter, the student may be ignoring the literature and concentrate on the problems of colour as a visual language and push towards new colour effects and combinations so pushing the boundaries of colour knowledge.

"Active concentration", by opposition to "passive concentration" used in autogenic methods, involves a process of mental focussing with active, goal-directed investment of mental energy and will power which implies an active effort of the person towards the intended result (like matching a colour as correctly as possible or realistically drawing an object). The Fine Arts trainee's concern, interest, attention and goal-directed efforts are devoted to the task of solving colour problems related to forms, texture, balance, etc. Colour experienced during concentration on these principles of color has a realistic and tangible quality. The student-artist through regular practice of these principles

develops an aesthetic meaning of colour which is a highly complex combination of perception, emotion, symbolism, cultural, educational as well as biological factors. In a general sense one may perhaps say that colour perception is submitted to a training in visual language in the case of art trainees.

If one includes now persons who are experiencing colour without making colour an object of special consideration, one finds as Hewald Hering, the German physiologist, wrote: "In general the individual gives no account of the colour which he has just seen. He never makes colour an object of special consideration, but uses it rather as a sign by the aid of which objects are recognized" (Overy 1969). What Hering was suggesting was that the way most people respond to colour in a normal everyday visual situation was far more like <u>recall</u> than <u>recognition.</u> He does not concentrate actively nor allows any psychophysiological shift to happen, so giving him a different attitude towards colour than the other groups.

<u>Hypothesis:</u> This exploratory work essentially considers the possibility that colour reactivity could or could not be changed by different trainings such as — Art Training and Autogenic Training, that it could remain a very subjective diversified and fluctuating phenomenon or that it can be conditioned by a learning process.

It is of interest to verify quantitatively:

a) if these groups react unanimously or differently to the colour stimuli and how significant and consistent these choices would be;

b) if there are colours which are always considered pleasant or unpleasant; is there a concensus on this matter; does it differ from group to group; are the choices consistent over a period of 4 months; could they be a useful index;

c) in terms of brightness, is the notion of pleasantness generally associated with light colors and unpleasantness with dark colours;

d) finally, in terms of psycho-clinical research, do trends in colour choices show some indication of changes in reactivity through the practice of autogenic methods, when compared to non-practicing Ss?

Chapter Two

Perspectives of Chromatic and Achromatic Stimuli

When examining the problem of subjective and emotional response to colour, three main aspects have to be taken into consideration: the biological cue, the socio-cultural symbolism and the aesthetic meaning of colour.

a) Biological aspects

Information on the mediating biological process is lacking but studies in the field generally point to agreement that the biological meaning is quite evident. Let us start simply with the observation of sensitivity to light and dark in plants or living organisms which do not possess visual sense organs, there is a response to the dark and light stimulus. If one goes further and observes the reaction of plants and animals to colour rays, changes in reactivity have also been noted (Kozhevnikov 1969, Gerard 1958, Kargere 1949). A newly born child develops the ability to "see", first, recognising brightness and darkness; it is the most primitive form of visual perception. After recognising movement shape and form, recognition of colour will be the last development of all.

In the introductory part of the Luscher Color Test,

M. Luscher explains the origin of color significance by night and day: light and darkness dictated the life of man: night brought an environment in which action had to cease while day brought an invitation for action. Passivity and a general slowing down of the metabolic and glandular activity was experienced at night while day brought with it the possibility of action and an increase in the metabolic rate and glandular secretion, providing energy and incentive. These two states could be associated with yellow and dark-blue. Luscher also interprets red as being significant of attack while green could mean self-preservation. The bipolarity of this explanation reminds us of Goethe's Farbenlehre which gave us plus and minus meaning to colours: red, yellow and orange being on the positive pole and blue, green and purple on the negative. This theory has inspired both artists and scientists to pursue a variety of experiments in the last 150 years.

It is also well known that colour plays an important role in animal behaviour (Kilham et al. 1969), in mating and reproduction and in recognition of their own species (Tinbergen 1942), in agressive response (Lorenz 1963), in food-seeking behavior (Skinner 1971, Delius 1969).

J.P. Guilford maintains that colour preference in man is innate and that environment and learning

experiences have little influence in colour preference. In a summary of his work (Guilford, and Smith 1959), he states that colour preference in North America can be described mathematically and allows accurate prediction of this preference. However, he does not mention whether time or socio-cultural change in the same society would alter this preference. Guilford's preference curve shows a high preference for blue, followed by red and purple and a low preference for greens and yellows. C.E. Osgood (1953) claims, on the contrary, that colour preference is shown to be the result of learning, slow and ardeous learning. G.W. Granger (1953) suggested that colour preference is related to aesthetic factors of a biological nature, the effect of colour being spontaneous and very direct cannot be only the product of an interpretation by learning. These differences of opinion on colour preference leaves the matter open for further studies which could focus on the kind of learning experience and the change occurring over time under different socio-cultural changes. The present study attempts to indicate the general trends of this problem. K. Goldstein (1939, 1942) and R.M. Gerard (1959) in their experiments with effects of coloured lights have shown a correspondence of wavelength of colours and "expansive and constrictive reactions" in subjects; leading to conclusions that colour reactivity is not limited to the visual system.

The experience of colour in its biological meaning resembles that of emotion, (Schachtel 1943) and man is the passive receiver of this stimulation and that it is not the product of an actively organizing mind. This biological meaning could also be called the natural meaning of colour because it is the closest to the primitive response. W. Luthe (1970) who makes a tentative conclusion from detailed analyses of visual phenomena during autogenic states posits "that functionally relatively independent brain mechanisms participate in the elaboration of, for example, structure, color or dynamics.." and "...that there exists functional interrelations between each of the specific mechanisms (e.g.,structure, color, dynamic) which are coordinated by another mechanism at a higher level of integration." When Luthe talks about the passive concentration necessary to autogenic states in the experience of internal chromatic differentiation and brightness one assumes that there could be a return first to the biological response to colour in the elementary stages of visual elaborations during the practice of autogenic methods.

The biological meaning of colour is derived from the older and more primitive area of the brain and to be able to recognize and distinguish and associate colour appears to be a function of the more educated part of the

brain - the neo-cortex- which allows more sophisticated symbolic interpretations.

b) Symbolical and Socio-cultural aspects

When the "symbolic" aspect is considered as a clue to colour meaning, one finds that it does not contradict the biological "givens" but somewhat springs from basic associations with the appearance of the object. In the classical associations red is associated with light and blood and action, yellow with fire and anger, black with earth and misfortune while white suggests cleanliness, water and inaction. Blue and green may symbolize tranquility, passivity, gloom but were never associated with light, nor fire, nore violence, nor agressivity.

There seems to be a bipolarity in colour depending on positive or negative associations, and also depending on brightness and saturation. Folklore brings associations of red with blood but the redness in blood can be associated with life or death; a proliferation of associations can stem from one pole or another and red becomes a symbol of love or violent passions. These symbolic associations become more sophisticated when they reach the language carrying with them not only symbolisations but signs

accepted by a socio-cultural milieu (*). D.M. Anderson (1961) gives an excellent retrospective of colour symbolism used in North America design and publicity. F. Birren and J. Kouwer (1949) examine the historical and folkloric tendencies of colour symbolism. No matter how anecdotal this aspect can be, one cannot underestimate the role in our colour-feelings.

Colour symbolization is also submitted to time factors and socio-cultural elements: "color means exactly what society says it means" (Anderson 1961). Comparative cultural studies (Child and Sumiko 1969, Child and Kastl 1968, Chougourian 1968, Norman and Scott 1952) have shown great variations in colour preference related to symbolic associations, sometimes in opposite directions. For example in our Christian civilization white is a symbol of joy while in Eastern cultures it is a sign of sadness and mourning, Yellow in the Western world is synonymous with treachery, sickness, cowardice, while in Japan or China and among some Indian tribes, it is a symbol of royalty,

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(*) Once I read Black Beauty, Snow White, Le Rouge et le Noir, Green Mansions, The Bronze Horseman, Riders of the Purple Sage, John Brown's Body, Bluebeard, Crome Yellow, The Copperheads, The Pink Panther. No problems. I was intrigued by The Scarlet Pimpernel and lurid yarns about the Purple Gang of Detroit. I watched the Crimson Tide play football against the Golden Bears. The Violets were my school team. No problems. I saw technicolor films of the Rainbow Division fighting two wars. The wounded received Purple Hearts. I recall the Golden Horde of Batu Khan. Still no problems. Mussolini had his Black shirts, Hitler his Brownshirts, the Americans their Silvershirts. The Blue Division consisted of facists volunteers on the

deity and sacredness. Colour also seems to have a different symbolic meaning for males and females (Spiegal et al. 1971, Schaie 1964); according to these studies, males generally prefer brighter and more saturated colours; Pink and Yellow seem to be more associated with the feminine sex (Welsh 1970). It was also observed that institutions of church and government are the most influential in the development of the colour symbol (Anderson 1961) but it appears that advertising and colour television are new colour symbol producers in the last decade creating new associations. It would also be interesting to verify the impact of geographical location on colour preferences or even the change in seasons affecting colour choices.

From an educational point of view, it is of interest to know that children's associative expression of colour and object appears around the age of five and six in their artistic expression (Brittain and Lowenfeld

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Russian (red) front. The American empire has its Green Berets. The Americans socialists once had its blueshirts. But no problems. One could cope. We've white collar workers and blue collar workers...

To buy a lemon is to get a lousy bargain. No business man, New Left or Old Right, wishes his organization to be in the red. To be in the black is considered financially good. When you're content you're in the pink. When you're low, you've got the blues. White slavery means prostitution. Humans are too often green with envy and white fear. People are habitually called yellow dogs and dirty pinkos. There's pornography describing the lavender set, containing purple passages...and still no union workers. You see?

Leslie Wolf Hedley: Color Blinds. [illegible] Oct. 72.

1947, Lindstrom 1964) but there is no doubt that unconscious associations manifest themselves earlier and are closer to the natural feeling, we have previously described, a child has for a coloured object. The symbolic and cultural meaning of colour is learnt behavior and should be distinguished from a personal colour feeling derived from subjective experience and which would be an important determinant of positive or negative feelings for a particular colour. This aspect becomes important when the child expresses his own symbol and has to choose between the socio-cultural symbolization and his own feelings toward the object he describes.

The biological and symbolico-cultural meanings are overlapping factors acting in the reactivity to a colour or to a group of colours, but the aesthetic meaning, which also plays a part in the colour choices, is far more complex and elicits differentiated responses which may be of considerably greater importance than the first two aspects. "Shades of colours like those of sounds are of a much finer texture and awaken in the soul emotions too fine to be expressed in prose" (Kandinksy 1937).

c) Aesthetic aspects

Theories concerning the affective and emotional significance of colour aesthetic expression are scarce and unsupported affirmation seem almost better than none.

As was previously mentioned, this implies far more complex response and differs markedly from the biological cue or the symbolic association. Factors of aesthetic meaning are numerous and intricate and are not easily isolated, nor, for that matter, verbalized. One can draw tentative conclusions from the testimony of artists on their colour feelings and the colour problems they exhibit may give some insights on the general direction of the affect content involved in an aesthetic color experience. For G. Molinari (1972) "emotional responses to certain juxtaposition of colours are the basis of the art of painting and painting itself is the only true field of research to be involved in the dynamic possibilities of colour".

Scientists often analyse colour as an isolated factor submitted to the rules of scientific methodology and arrive at a specific concept of colour which is quite remote from the artist's introspective and phenomenological preoccupation of colour in the aesthetic experience. The artist or colourist examines how colour works in terms of interaction and relationships with other colours and forms. Colour lends its charms, its personality or its ugliness to the form with which it is seen but these characteristics are likely to vanish if an attempt is made to view them by themselves. To be more specific, the artist

deals with the visual language of colour while the scientist analyses colour through an intellectual approach and in so doing works at a different level of abstraction.

Many artists have attempted to analyse sometimes systematically their visual feelings toward the colours they use. Kandinsky and Klee left us notes on the subject. Mondrian, Delaunay, Léger, Itten and more recently, colour field painters, were seriously involved with the problem and few attempts have been made to verbalize preoccupations. We are all indebted to Josef Albers (1888) for his lifetime contribution to the understanding of the aesthetic meaning of colour. But these creative minds were more concerned with the visual phenomena of colour than isolation factors describing the emotional significance of their colour choices.

In observing the mood of a work of art, one finds it suggests gaiety, gloom, satire, violence, but here, the colours which might suggest this mood are combined with a significant formal arrangement involving a complex visual, perceptual, tactile or kinesthetic sensation. The colour stimulus contains a message but it is submitted not only by the basic instinctive aspect but also by the symbolism, the shapes and the principles of design. Colour in an aesthetic expression does not exist as such, it is always

a colour-form problem which will be treated with balance; its brightness and dullness, the light and dark, the warmth and coolness, the dosage, rhythm, harmony and complementarity will be used selectively in the keying in order to achieve a desired mood. "Pure res, yellow, blue may be the zero level of color, slight in dynamics and therefore slight in expression; but reddishness, yellowishness and blueness would produce tensions without which no expression is possible" (Arnheim 1954). Hypothesizing on colour, Rudolf Arnheim (1914) emphasized the problem of visual tension also expressed by Kandinsky's use of colour. This perspective may also relate to the symbolical inner tensions psychologists and certain colour tests (e.g. Luscher Test 1969, Color Pyramid Test 1964) are concerned with.

Colour in its subjective value has to be considered also in the light of the synesthetic phenomena. " We don't see only with our eyes but with our whole body" (Gregory 1970). Colour may arouse associations ordinarily channelled by other senses. Colour associations have been reported with music (Karkoski and Odbert 1938). Colour and smell as well as colour and touch are often experimented in classroom situations as aesthetic experience. Finally, colour and ESP have been the object of stimulating hypothesis (Yantz 1968).

For a long period in Art History, a colour problem

was considered to be intimately linked to a light problem. This was particularly so with the Impressionists. The problem of 'pure colour' as a means of expression goes back to the Post-Impressionists and the Expressionists. For example, Kandinsky's great sensitivity to colour enabled him to use colour to create visual tensions. He describes it in the following terms: "Legitimate and illegitimate combinations of colours, the shock of contrasting colours, the silencing of one colour by another, the sounding of one colour through another, the checking of fluid colour spots by contour of design, the overflowing of these contours, the mingling and the sharp separation of surfaces, all these are great vistas of purely pictorial possibilities." (Overy 1969). Here again, it seems evident that aesthetic experience gives a large part to the "pictorial possibilities" rather than the emotional out-going manifestation linked with colour.

Some painters tried to evolve systems to define and ascribe specific objective emotional responses to certain colours. This idea was inspired partly by physiologist Ewald Hering (1834-1918). Hering's theory states that there appear to be four primary sensations (red, yellow, green, blue) plus black and white, making six primaries altogether. The artists deriving their colour system from Hering and Ladd-Franklin's theories make divisions on the basis of the psychological impact

colours create rather than on the traditionnal complementarity based on discoveries in physics (Newton, Helmotz, Young, etc...). Mondrian's system (1872-1944), for example, is based on the exclusion of colours except for red, yellow and blue, and white, black and greys, so expressing his neo-plastic value of colour and non-colour. For the French painter, Herbin (1882-1960) certain colours are expressing depth in space (blues), others are frontal space (red). Some have outward ray-like effects (yellows) others have inward movement (blue). Some colours express mobility (red, yellow, blue) others immobility (white, black and green) and others express both mobility and immobility depending on their relationship (pinks and purples). It is interesting to note here that these rules attempts have often been contradicted by talented artists who have used these colours in such a way that it contradicted visually the principles set up. And one supposes that this boundary breaking is an intimate part of artistic research.

According to Molinari (1972) "the artist depending on the narrative character of the colour-message establishes a system of oppositions between groups of colours, introducing in his work an element of duality which mirrors the component of representative art". For Molinari, colour as an element of aesthetic expression acquires a dialectic

function in the concept of seriality. It is through repetition, relocalization and reoccurrence that a colour acquires its meaning. Seriality is also based on a constance of form and avoidance of texture.

The rationale behind Albers' work teaching is, on the other hand, the essential relativity of colour; it is a principle of dominance also, "independent of harmony rules, any colour goes or works with any other colour, presupposing that their quantities are appropriate". Finally, other painters, in order to avoid the problem of duality have attempted to isolate colour by one colour or monochromatic painting which emphasizes the formal aspect of shape, size, format and texture; but monochromaticism is non-colour in a way because it destroys it by giving an emphasis to other visual qualities. Newman and Kelly are painters who have emphasized spontaneity, texture, size, shape and formats through colours. It is rare when a single colour in isolation mediates aesthetic properties. It seems that the combination factor brings about a more important source of information which would be artificial to deny when studying effects of colour, because it brings about the stress, the tension, the harmony necessary to colour dynamics and by the same token revealing the mood the emotion and affect of a personality.

Despite the complexity of the aesthetic meaning

of colour and the colour theories influencing it, one finds a common direction, superimposing the biological, the symbolic, the socio-cultural and the aesthetic. All these perspectives are not contradicting each other but are reaching different levels of colour significance.

Chapter Three

Autogenic Methods and Chromatic Differentiations

In order to understand the notion of colour associated with autogenic methods, it is necessary to distinguish between the types of colours seen in the visual world and thoses which are of internal nature (i.e. elaborated in the inner visual field).

Colours we see in the visual world appear to us as three main types. David Katz (1935) divides these into surface colours, film colours and volume colours. Surface colours is the kind we associate with the colour we see on objects and this surface acts as a visual past which the eye cannot see. Film colour is more like what is seen when looking at the sky lying on the back; it has a "spongy texture" and these colours do not appear to have a surface in the same sense as the surface colour. Volume colours are seen as organized in and filling a three-dimensional space. They are transparent, although they may be slightly cloudy. Katz compares this type of colour to the "voluminousness of a fog" when objects can be perceived through it".

There are colours which are never seen in the visual world. Oliver Jelly (1969), in an "Essay on Eyesight" calls it field colour; "They are based on

TABLE 1: Verbal Description of Autogenic Colours

Case 88: A 31-year-old social worker (anxiety reaction, situational stress reaction, mild depression). In the following autogenic abreaction (AA 3) there occurs a characteristic development from an initial emphasis on stages I and II to a progressively increasing appearance of more differentiated visual elaborations of stages III and IV (see *italics*).

"Nothing special yet . . . [coughing] . . . it's rather blue . . . little light to the right [big sigh] . . . it's still rather blue-green, like a blue-green circle toward the left . . . [sigh] . . . like lines of . . . like a sun with rays all around . . . a pale blue glow, a . . . a circle in the center, very pale blue, another one . . . another sun . . . [sigh] . . . mmm . . . toes . . . it's black but it's like little, little white dots, very small . . . little white dots continuously moving on the black . . . a pale blue opening . . . [sigh] . . . it's much clearer much clearer glows . . . [cough] . . . oh, it's that again, it moves, I can't explain it, it's, it's rather black, like white glows moving about . . . [sigh] . . . as if something was, it's very black . . . [sigh] . . . it's still black . . . [sigh] . . . it's darker in the center . . . [sigh] . . . it's darker in the center and lighter all around . . . [sigh] . . . somewhat green, turquoise . . . very green, black . . . [sigh] . . . it's still green . . . mmm . . . rather black . . . [cough] . . . mmm it turns green again, black . . . [sigh] . . . it's lighter toward the center, like in the distance, like a, a white circle in the distance that gets smaller and bigger, it's still there . . . it gets smaller as it nears me, then no, it gets smaller as it goes farther away . . . [sigh] . . . it gets bigger . . . like a mauve glow around it . . . that moves back, the mauve glow comes nearer, still a dot in the distance, a mauve glow that's closer up, like a sort of horn more to the left . . . there's still a white dot in the distance, a mauve glow coming nearer, getting bigger . . . a white dot in the distance . . . the mauve glow is very close . . . [sigh] . . . disappears . . . nothing . . . like two eyes, turquoise-blue, mauve . . . a circle with rays . . . [sigh] . . . [sigh] . . . I feel more relaxed . . . it's rather blue . . . still blue, green with a few rays . . . blue-green and clouds . . . *fingers* . . . pale green, lighter, nearly white . . . it's still nearly white . . . [sigh] . . . eh . . . [big sigh] . . . gray-white . . . [cough] . . . a white circle in the distance, pink, black and white, between the two, a trefoil . . . darker . . . *steering-wheel, steering-wheel of a car* . . . [sigh] a paler circle that gets smaller, that gets bigger, that that gets smaller, gets bigger, gets smaller, gets bigger gets smaller, gets bigger, gets smaller . . . gets bigger, gets smaller . . . gets bigger, gets smaller . . . there's some pale blue in the middle that stays put, but it's all around that that gets bigger, that gets smaller, like the black that gets bigger then that gets smaller, and the blue circle stays put . . . gets bigger then gets smaller . . . the black gets smaller, gets bigger . . . [sigh] . . . the blue gets a bigger nothing more, it gets smaller . . . it's green, it's gray . . . gray, white clouds, blue . . . blue clouds then down below it's black . . . green . . . rays from the sun . . . [sneezing] . . . gray, gray, nothing, blue-gray, it's as if it was the sky, clear sky, nothing it's still the sky, blue sky . . . darker, still the sky . . . eh . . . blue-gray . . . *a white horn* in the center . . . like a gray sky with white clouds . . . [sigh] . . . it's still the gray sky with a black cloud in the distance . . . [big sigh] . . . still the gray sky, blue-gray, a black shape, I don't know what, the shape gets smaller . . . it's moving, gets smaller, gets still smaller . . . it starts off big then gets small like a circle, it's pale blue in the middle and black all around, it gets smaller, it gets smaller . . . lightning to the right . . . [sigh] . . . a pale blue sky . . . still a pale blue sky . . . a sprinkler toward the left . . . a nose . . . [sigh] . . . gray . . . a black circle that gets smaller . . . a white circle in the middle that also gets smaller . . . still the same thing, it's getting smaller all the time . . . [sigh] . . . it starts off big, it gets small like the opening of a horn that is getting smaller, that is getting smaller . . . [sigh] . . . it's gray . . . sad tones . . . mauve, black clouds, black dots moving about . . . blue sky with rays of the sun in the middle . . . [very big sigh] . . . rather dark but not black . . . again the dark sun with its rays in the middle, the rest is lighter . . . a much happier tone . . . still the same thing, the dark circle with dark rays on a light background . . . [sigh] . . . the rays are turning . . . still turning . . . fixed . . . aurora borealis . . . a bottle . . . a nose . . . [sigh] . . . clouds . . . a clear dot that showed up at the right, but that disappeared as soon . . . dark up above lighter down below . . . a few mountains down below . . . a blue-gray sky . . . a darker sky . . . a sadder tone . . . another circle that's getting smaller, that's diminishing . . . [sigh] . . . still the same thing . . . it gets smaller still the same thing, still the same thing, still the same thing . . . the background is blue-black . . . still the same thing, still the same thing, the background is blue-black, and it's a white circle that becomes, that diminishes, that diminishes like a horn . . . [big sigh] . . . [anxious voice] . . . it's rather blue . . . a nose . . . gray . . . *a rolling pin* . . . rather [illegible], like a road that gets smaller in the distance, that is wider up this way, it was white on a black background . . . a *telescope* . . . *a nose* . . . *a face, like the silhouette of a woman*, but eh . . . horizontal . . . forms that are moving about, but I don't know what . . . forms that are moving, that are getting smaller . . . again the sky which is blue, blue, blue . . . *a happy tone* . . . again a blue sky . . . [sigh] . . . darker . . . [tired tone] . . . *piano notes, fingers, corn on the cob, molded Jello*, forms that are moving toward the left . . . *a hand* . . . *a road that gets wider up this way, a white road on a black background* . . . [dull voice, sigh] . . . vague . . . [big sigh] . . . nose toward the left . . . circle that gets smaller, that gets bigger . . . pale circle on a black background, gets bigger . . . the background is pale, black forms disappearing . . . pale blue background . . . *a nose* . . . *boats or steeples on edge of a bank* . . . [sigh] . . . darker . . . sad . . . darker and a white square like a window up above . . . gray, but less dark . . ." (38 min.; termination).

SOURCE: W. Luthe: Autogenic Therapy: Vol.V, Dynamics of Autogenic Neutralization. 203

'automatic' colours that present themselves to the retina or cerebral cortex under certain conditions". These include colours seen through closed eye-lid under bright sunlight or artificial light, negative after images (the complementary colour seen after staring for some time at a bright patch of colour) and the colours seen under drugs, in hallucinations, hypnotic and self-hypnotic states and when pressure is exerted on the eyeballs. These 'automatic colours' are often, although not invariably accompanied by 'automatic objects which are usually of a geometric kind". (Jelly 1969). Generally field colours belong to an abstracted or introspective way of seeing.

Recent psychophysiological studies on imagery and biofeedback (Brown 1971, Horowitz 1970, Zusne 1970, Richardson 1969, Luthe 1969-1970, Singer 1966) have shown that human beings when lowering their brain waves and producing alpha waves and theta waves reach a specific point when spontaneous hypnogenic images are produced. This half-awake, half-dreaming state seems to condition spontaneous visual elaborations - including colours - which amazingly correspond to descriptions of states of mind described by creative genius in their creative moments. It could very well be that with proper training, a great number of individuals could experience states of mind formerly reserved to exceptionally creative minds.

Autogenic methods, although they differ sensibly in orientation from biofeedback and popular mind-control techniques, aim at a mobilization of normal self-regulatory functions of our mental and bodily activities. Autogenic methods, also known under the names of 'Autogenic Therapy' or 'Autogenic Training', are the result of almost a century of psychophysiologically oriented research on factors involved in sleep, hypnosis and artificial sleep. The 'Autogenic State' is reached through passive concentration on psychophysiologically adapted verbal formulas (heaviness, warmth, cardiac regulation, respiration, abdominal warmth and cooling of the forehead). The regular practice of a series of six 'Autogenic Standard Exercises' aims mainly at "multi-dimensional psychophysiologic relaxation and facilitation of certain self-normalizing brain functions". (Luthe 1969). Autogenic approaches also include methods of 'Autogenic Modification' (i.e. Intentional Formulas, Organ-specific Formulas) and methods of 'Autogenic Neutralization' (i.e. Autogenic Abreaction, Autogenic Verbalization). 'Autogenic Meditation' is an advanced approach including exercises leading to a a) spontaneous experience of colours, b) an experience of selected colours, c) the visualization of concrete objects, d) visualization of other persons, and e) answers from the unconscious. (See Table 2).

TABLE: 2 Autogenic Methods

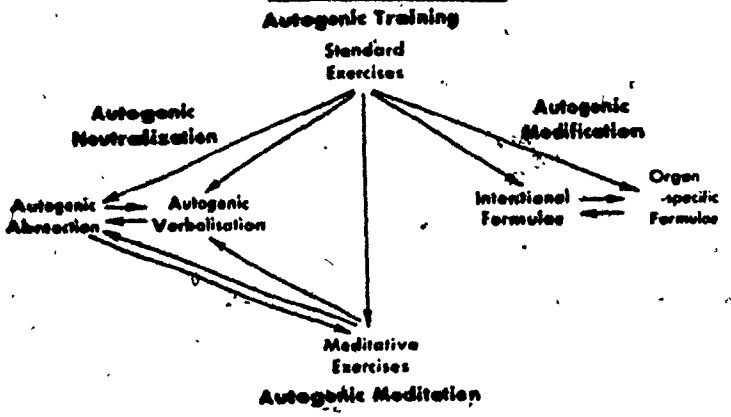


FIG. 1. Schematic presentation of various combinations of autogenic approaches. The arrows indicate therapeutic possibilities of treatment programs using case-adapted combinations of specific autogenic methods, which may be indicated after the patient has learned the six standard exercises of autogenic training.

(a) Use of *passive concentration* on autogenic standard formulae aiming mainly at multidimensional psychophysiologic relaxation and facilitation of certain self-normalizing brain functions during the autogenic state (Autogenic Training: six standard exercises).

(b) Use of *passive concentration* for the purpose of promoting additional physiologic changes of a more specific nature (Autogenic Modifications: organ-specific exercises).

(c) Use of *passive concentration* on additional case-adapted formulas which are more specifically designed to support or neutralize psychologically oriented functions (Autogenic Modifications: intentional formulae).

(d) Initial use of *passive concentration* upon autogenic standard formulas (see a) with subsequent engagement in advanced exercises of the Meditative Series (Autogenic Meditation: seven meditative exercises).

(e) Initial use of *passive concentration* upon autogenic standard formulas (see a) and subsequent shift to *passive acceptance* (*"carte blanche"*) for further facilitation of brain-directed processes of psychophysiologic neutralization (Autogenic Neutralization: autogenic abreaction).

(f) Initial use of *passive concentration* upon autogenic standard formulas and subsequent shift to neutralizing verbalization of circumscribed or predetermined themes of acutely disturbing nature (Autogenic Neutralization: autogenic verbalization).

Combinations of these different autogenic approaches permit flexibility and precision of clinical and non-clinical application. For example, autogenic methods can be adapted for the treatment of a variety of medical disorders (see: Clinical Applications, Vols. II and III) in combination with other medical forms of therapy, or, by using relevant combinations, autogenic approaches may be used in conjunction with psychoanalysis or behavior therapy. Autogenic approaches have been used to cope with post-operative urinary retention or with problems of non-clinical nature as they may occur in the field of sports or education (see: Non-clinical Application, Vol. III). A combination of autogenic standard training with methods of autogenic neutralization may also permit treatment of psychodynamic disturbances which are beyond the limits of psychoanalysis.

SOURCE: W. Luthe, and J.H. Schultz: Autogenic Therapy Vol.I, Autogenic Methods, 2. (with permission of the authors).

However, autogenic methods should not be confounded with existential or philosophically oriented points of view which open up contemplative dimensions. Observations reported by a number of authors who applied autogenic methods in the field of education and industry (Sellers 1967, Snider, and Oetting 1966, Bauer, Wetta, and Durand de Bousingen 1965) and by trainees practicing these methods regularly agree in various aspects "that generally , the regular practice of Autogenic Methods is of help in enhancing adaptive functions, in increasing sensory awareness and in facilitating the liberation of inhibited mechanisms, letting the brain-designed, self-regulatory mechanisms take over" (Luthe 1970, Vol.III,162). It was often observed that artists, for example, were confronted with self-reactivation of their creative dynamics, other persons who had never been interested in creative activities reported to be stimulated by their own visual sensory experiences and began to engage in creative activities (Luthe 1967). Artists have noted that the regular practice of autogenic standard exercises influenced the way they approached painting (e.g., "artistic projections grew almost by themselves from deep within". Such observations were supported independently by different trainees and by critics as well).

TABLE 3: Visual Phenomena during Autogenic Neutralization

TABLE 33. *Stages of Brain-Directed Visual Elaborations during Autogenic Training and Autogenic Abreaction*

Stage I: *Static Uniform Colors*
Elementary stage characterized by one-tone color filling the entire visual field (mostly dark shades). Frequently described as "just nothing," "a blank" or "as if my eyes are closed." Less frequent are lighter shades (e.g.; silvery gray, yellow, pink, light blue).

Stage II: *Dynamic Polymorph Colors**
Elementary stage with more differentiated elaborations of chromatic, structural (e.g., cloud-like, shadows, vague forms) and dynamic features (e.g., various simple movements).

Stage III: *Polychromatic Patterns and Simple Forms†*
Elementary stage with more differentiated and specific elaborations of forms (e.g., disks, ovals, rings, dots, lines, textile patterns), colors (e.g., purple, brown, blue, green) and dynamic features (e.g., turning, coming closer, getting bigger, undulating, "flying," "falling").

Stage IV: *Objects*
Further structural and chromatic differentiation of mostly static objects (e.g., utilitarian, ornamental, symbolic, faces, masks, monsters) which appear on a background of mostly dark shades of colors. Realistic or unrealistic dynamic features (e.g., "a turning coffee pot," "a moving candle") may occur.

Stage V: *Transformation of Objects and Progressive Differentiation of Images*
Development of differentiated images (e.g., interiors, outdoor) of progressively increasing complexity with gradual transformations, displacements and polychromatic features. Realistic and unrealistic components may be distinguished. "Self-participation": rare.

Stage VI: *Filmstrips*
Highly differentiated and complex elaborations of structural, dynamic and chromatic elements. During advanced phases of this stage the trainee may occasionally change from the role of a passive observer into an active participant (e.g., "Now I am looking out of a window"). Realistic and unrealistic features are distinguished.

Stage VII: *Cinerama*
Highest level of elaboration with prolonged periods of self-participation (e.g., "I am choking my father," "I am being eaten up by a huge monster," "I am driving along a road"). Realistic and unrealistic developments may alternate.

* Stimulation of the occipital lobes (areas 18, 19) of conscious patients produced visual phenomena which are in general agreement with visual elaborations of stages II and III (Penfield, W. and Rasmussen, T.: *The Cerebral Cortex of Man*. The Macmillan Co., New York, 1950).

† See also Penfield, W. and Jasper, H.: *Epilepsy and the Functional Anatomy of the Human Brain*. Little, Brown & Company, Boston, 1954, 116 ff.

SOURCE: W. Luthe: Autogenic Therapy: Vol.V, Dynamics of Autogenic Neutralization. 188.

TABLE 4: Visual Phenomena

Levels of Chromatic Differentiation and Brightness of Visual Phenomena during Autogenic Abreaction

	Visual Phenomena			
Levels	Brightness of Background	Surface of Visual Field Involved (background/object)	Chromatic Differentiation, (object, structure)	Brightness of Object, Structure
0	Black	(Uniform/none)	None	Black
I	Almost black (e.g., purple-black, blue-black)	Up to 1% of visual field	Monochromatic	Almost black
II	Very dark (e.g., very dark purple, very dark blue, very dark brown or red, very dark gray)	1-5% of visual field	Bichromatic	Very dark.
III	Dark (e.g., dark blue, dark red, dark green, dark gray)	6-10% of visual field	Trichromatic	Dark
IV	Medium (e.g., blue-green, red-orange, green, neutral gray)	11-25% of visual field	Polychromatic with two predominant colors	Medium light
V	Light (e.g., yellow-orange, yellow, green-yellow, light blue, light gray)	26-50% of visual field	Polychromatic with two predominant colors	Light
VI	Very light (e.g., yellow-white, white)	51-80% of visual field	Polychromatic (very much differentiated)	Very light
VII	Very bright (e.g., bright yellow, bright white)	81-100% of visual field	Very high degree of chromatic differentiation	Very bright

VISUAL PHENOMENA

Levels of Unreality and Reality of Visual Phenomena during Autogenic Abreaction

	Visual Phenomena		
Levels	Structural Features	Dynamic features	Chromatic Features
0	No reality features	No reality features	No reality features
I	Very symbolic and deformed (e.g., shadows, spots, forms void of any particular meaning)	Very symbolic, highly artificial movements, very much deformed dynamics	Monochromatic
II	Very symbolic without deformation (e.g., nail, breaststick, ring)	Very symbolic but without deformation of reality dynamics	Achromatic or unreal
III	Symbolic but taken from reality (isolated from reality context; e.g., penis, breast)	Symbolic but taken from reality (isolated from reality context; e.g., umbrella, opening and closing)	Achromatic with some aspects of reality
IV	Some aspects of reality, but with certain modifications (e.g., deformed penis on normal body)	Some aspects of reality, but with certain modifications (e.g., empty sediment on a lake)	Some aspects of reality, but with certain modifications
V	High degree of reality	High degree of reality	High degree of reality

SOURCE: W. Luthe: Autogenic Therapy: Vol.V, Dynamics of Autogenic Neutralization. 198-199.

W. Luthe (1969-1970) has observed seven stages of spontaneous visual phenomena occurring during the practice of Autogenic Standard Exercises and Autogenic Neutralization. These visual phenomena appear to be related to what O.Jelly qualified as 'automatic images'. Detailed studies of these visual elaborations indicate that "such visual phenomena may vary from very simple (e.g., non-chromatic. cloud-like formations) to highly differentiated cinerama type productions" (Luthe 1969-1970). The components of these visual elaborations (structural, chromatic, dynamic, brightness) may undergo changes in the nature of the background, the structure of images, and in the dynamics of the background and structure. The regular practice of Autogenic Standard Exercises and other autogenic approaches is accompanied by an increase in chromatic differentiation and brightness while images and dynamics tend to be more complex and realistic.

W.Luthe studied the functional interrelations of these spontaneous visual phenomena (Table 3-4) as they occur during the practice of autogenic methods came to the tentative conclusion "that functionally, relatively independent brain mechanisms participate in the elaboration of, for example, structure, color, or dynamic" (1970). Further research on this matter could be of interest giving more information on the process of imagery formation.

Studying more particularly the variations in chromatic (achromatic) differentiation and brightness of these internal visual manifestations, W.Luthe makes five distinctions: a) the brightness of the background; b) the spatial quantity of the background; c) the quantity of the structure; d) the chromatic differentiation of the structure; e) the brightness of the structure. From these data (see Table 3-4), he concludes that "generally the chromatic differentiation goes from dark to light". The increase of light, and particularly bright elaborations usually coincides with a more positive orientation of the trainee. During intermediate and advanced visual stages, the participation of a coordinating reality mechanism becomes more obvious. Aside from the reality mechanism, another independent component is "the feeling tone" (i.e. pleasant and unpleasant). This affective component can be present at all stages of visual elaboration, showing a general direction towards positive feelings as the trainee advances with the neutralization of accumulated brain-disturbing material and self-normalizing processes progress in a brain-desired manner. During autogenic neutralization it was noted that pleasant feelings are usually associated with lighter shades of colours (e.g. light blue, silver-gray, yellow, pink) while unpleasant colour feelings are generally associated with dark shades (e.g., black,

dark purple, dark brown, dark shades of gray or blue).

In volume one of Autogenic Therapy, Luthe reports that lighter shades of purple, red-orange and yellow may coincide with an increase of the feeling of warmth (i.e., 2nd Standard Exercise). Blue is occasionally associated with an increase in coolness on the forehead and appears to have a calming effect (i.e. 6th Standard Exercise). Black and dark purple ten to be linked to unpleasant associations, depressive feelings or an overall feeling of general fatigue. When red tones occur repeatedly, there is a high incidence of traumatic associations usually accompanied by feelings of anxiety. It was also clinically observed (Wallnöfer 1964) that the practice of autogenic standard exercises seem to affect colour preferences, H. Wallnöfer reports an increase in preference for yellow and a decreasing preference for dark blue over a period of several weeks.

It is of interest to note that feeling tone and colour appear to vary from one individual to another, or for that matter, from one time period to another, depending on the constellation elaborated by each individual's brain. It also seems that this relationship between feelings and colour can serve as a clinical index, indicating a general orientation towards positively or negatively oriented psychodynamics.

Chapter four

The Experimental Approach

A. Introduction

In the previous chapters, different perspectives on colours were presented, giving an outlook on the current discoveries and hypothetical tendencies made in regard to the emotional impact colour can have on human beings. Art students in a formal teaching situation will most likely be interested in the aesthetic properties of colour. Classes given on colour as an element of the visual language are generally aiming at a greater awareness and sensitivity to colour and a better understanding of colour relationships. The exploratory assignments, the art school environment, the confrontation with other people's work may or may not affect personal colour sensitivity of the student, but it is expected that he will become more knowledgeable and discriminative as to the 'aesthetic' and 'non-aesthetic' value of his colour choices. A progressive change in opinion and emotional attitudes towards colours has been subjectively observed by studio teachers in their beginner classes during the first three months of apprenticeship, as the new student discovers the aesthetic possibilities of pale, dark, muted or bright chromatic and achromatic formal and dynamic arrangements. Moreover,

advanced art students are expected to have mastered this discrimination to colour and therefore may or may not show more consistency in their choices as to what they evaluate as a 'pleasantly-aesthetic' or 'unpleasantly-unaesthetic' colour arrangement. Differences existing between beginners and mature students may or may not appear using colour as a valid yardstick.

To test the problem further, it is interesting to compare art students with beginning science students whose laboratory experiments require a certain amount of discriminative abilities to colour (i.e. solutions, tissues, sample identification, etc...). Regular colour identification is part of the task of these students and their judgement depends on colour perception of a different order than art students or autogenic trainees. It is also interesting to verify how differently people who are not specifically considering colours behave in their colour choices. Their reference to colour being related to what we described as biological, socio-cultural and symbolic meanings rather than being related to a specific training.

On the other hand, it was previously stated that trainees practicing Autogenic Methods regularly appear to experience a progressive sensitization to colour, structures, dynamics and brightness (Luthe 1969, 1970) and that this internal vision stimulates an interest in creative

expression even among trainees who were never directly involved with this type of expression. W. Luthe also observed that experience in pale colours and brightness of the visual field is accompanied by more positive feelings while darker colours seem linked with feelings of anxiety and traumatic experiences. It is of clinical interest to verify if a change in colour choices occurs as the trainee gains in experience and if there is a tendency towards brighter and paler colour choices as the trainees' neutralization of problematic themes occur. Futhermore, does a person who rests periodically, without "passive concentration", show the same tendencies in colour choices than autogenic trainees?

Finally, it is of interest to compare autogenic trainees and art students in their ability to discriminate colours related to feelings of pleasantness and unpleasantness, if one considers the possibilities of combining Autogenic Training (in a non-clinical application) and art teaching, in an attempt to achieve an increase in awareness and sensitivity and a more personal expression of the creative impulses.

B. Hypothesis:

A person's discriminative reactivity in selecting "pleasant" and "unpleasant" chromatic and achromatic stimuli changes during the course of studies in Art

in the same manner as during the regular practice of brief mental exercises of passive concentration on psychophysiologically adapted stimuli, (Autogenic Standard Exercise) which are unrelated to colour perception.

A. Are colour choices significant within groups?

B. Are there differences in colour choices between groups? And over time?

C. Is there a light/dark dichotomy for "pleasant" and "unpleasant" colours?

C. Method:

It was of interest to verify quantitatively the reactivity and choices of colour made when 24 colour stimuli (Color Pyramid Test) are given to Ss who are practicing Autogenic Standard Exercise, student-artists who are training in the same Fine Arts programme and Ss who are experiencing colours but who do not make colour an object of special consideration. Application of the Color Pyramid Test (CPT) before and after 8, 12, and 16 weeks was made to the following eight groups of 15 Ss each:

Group A, advanced students in Art (BFA) taking the same course in painting emphasizing colour problems. 15 Ss.

Group B, beginning students in Fine Arts Programme taking the same course in painting emphasizing colour problems. 15 Ss.

Group C, beginning students in Science (dealing with coloured solutions and materials) 15 Ss.

TABLE 5: THE STANDARD COLORS OF THE COLOR PYRAMID TEST.

Color Sample	Color Name	Munsell Value	Color Sample	Color Name	Munsell Value	Color Sample	Color Name	Munsell Value
	Red 1	2.5 R 7/10		Green 1	7.5GY 7/10		Purple 1	10 P B 8/4
	Red 2	5R 4/15		Green 2	7.5GY 7/10		Purple 2	5RP 4/12
	Red 3	5R 3/12		Green 3	2.5G 5/10		Purple 3	5RP 2/4
	Red 4	2.5RP 2/8		Green 4	2.5G 2/4		Brown 1	2.5YR 4/6
	Orange 1	2.5YR 6/14		Blue 1	10B 6/6		Brown 2	2.5 YR 3/4
	Orange 2	2.5YR 7/16		Blue 2	5B 6/8		White	N9.5
	Yellow 1	5Y 8/14		Blue 3	5PB 4/10		Gray	5Y 7/2
	Yellow 2	2.5Y 8/12		Blue 4	7.5PB 8/4		Black	N1

Group D, non-students engaged in other occupational activities unrelated to colour. 15 Ss.

Group E, Ss beginning to practice Autogenic Standard Exercise regularly. 15 Ss.

Group F, Ss who have no knowledge of Autogenic Standard Exercises and techniques and who practice "simulated exercises" (i.e. resting comfortably for 5 min., three to five times a day, eyes closed). 15 Ss.

Group G, Ss who practiced Autogenic Standard Exercises for more than six months and who are still under training. 14 Ss. One test was applied after more than 16 weeks.

Group H, Ss who practiced Autogenic Standard Exercises (long-term trainees). 21 Ss. One test was applied after more than 16 weeks.

Matching of Groups: Group E was the initial sample and other Ss were matched according to sex, age, Catholic Education, occupational activities and socio-cultural background. 30 males and 96 females; the age varies between 18 and 49 years. Ss are French Canadian with catholic education and belonging to a middleclass socio-cultural background. Occupational activities were matched as closely as possible and the level of education varied from first year college to doctoral degree.

Material: Color Pyramid Test (CPT) colours: a spacy box containing a mixture of 24 colours (25 X 25 mm cardboard squares) with equal numerical presentation of the

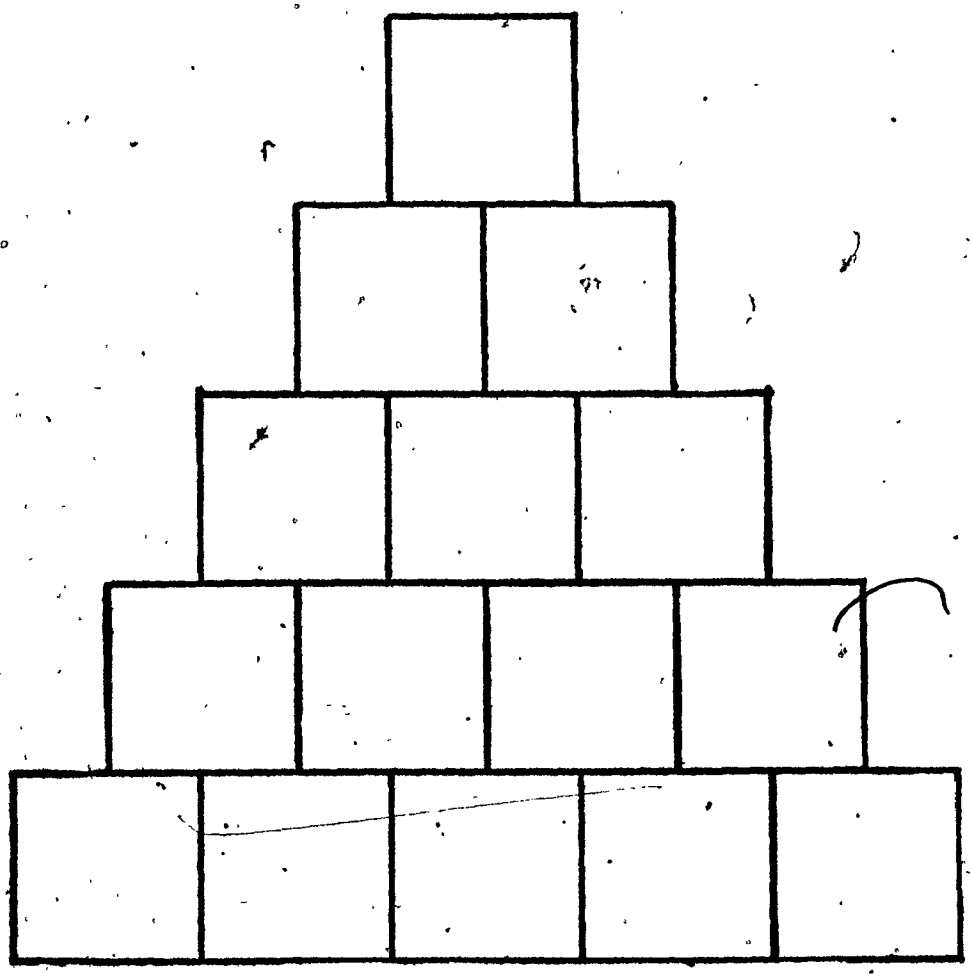
following colours: black, white, one shade of grey, two shades of brown, yellow and orange, three shades of purple and four of red, green and blue (See Table 5).

Test form: a white sheet of paper showing a printed five layer pyramid consisting of a total of 15 squares (25 X 25 mm.)(See Table 6).

General Instruction given to subjects: First test phase. The S is asked to make a "pleasant looking" colour pyramid by selecting relevant colour squares from the box and placing them on the test form. After completion of the first pyramid (notes taken by the experimenter), all colour squares are put back into the box. Then, the subject is asked to do another pleasant pyramid, and finally a third one. After completion of 3 pleasant-looking pyramids (i.e. selecting colours for 45 squares and arranging them in a chosen manner), the second phase begins.

Second test phase: The S is asked to make an "unpleasant looking" colour pyramid by selecting relevant colour squares from the box, placing them on the test form. After completion of the first pyramid, all colour squares are put back into the box. The S is then asked to repeat a second and a third time. The Color Pyramid Test was among other tests because it was a validated instrument measuring colour and personality and devising a new colour set could have created reliability problems.

TABLE 6: Test Form of Color Pyramid Test



Statistical approach:

Method of Analysis: it was first determined if colour scores deviated significantly from their expected value. Since there were three pyramids, each with 15 choices and 24 colours available, an expected value of 24/15: 1.875 for each colour value was calculated. Thus the null hypothesis tested, using Student's T-distribution was that the sample colour scores equalled the population value of 1.875 (See technical appendix 1). Similarly, tests of significance of differences were computed:

A. Between testings of the same group, to see if any trends in colour preference were developing.

B. Between groups for the same testing. To gain insight into groups total colour preferences over time, Kendall's rank correlation coefficient was computed between testings 1 and 2, 2 and 3, 3 and 4, 1 and 4, for "pleasant" and "unpleasant" pyramids respectively (See technical appendix 2.).

Finally, to examine the dark/light dichotomy for "pleasant" and "unpleasant" pyramids chi-squares were computed for 2 X 2 contingency table (See technical appendix 3).

D. Results

A person's discriminative reactivity in selecting "pleasant" and "unpleasant" chromatic and achromatic stimuli changes during the course of studies in Art in the same manner as during the regular practice of brief

mental exercises of passive concentration on psychophysiologically adapted stimuli (Autogenic Standard Exercises) which are unrelated to colour perception.

a) - Were colour choices significant within groups?

When considering colour choices, it was important to establish which of these choices had consistency (i.e., significantly high pleasant choices combined with significantly low ugly choices or vice versa), for the choice of certain colours were significant statistically but not necessarily consistent. (See Appendix).

For Group A (advanced artists) there was little consistency. Statistical significance was poor, as with other groups, because of large standard deviations. More "ugly/unpleasant" scores were significant (30) than "pretty/pleasant" scores (26) - this was particularly so in the first testing, when a high degree of agreement existed as to what constituted an ugly colour. In subsequent testings, this agreement lessened. There appeared to be a tendency, over time, for the ranking of pretty colours to stabilize, as seen in the increased rank correlation coefficient (See Table 7). A lower coefficient occurred on ugly colours and the trend was downward over testings. In general, Red 1 and Black were associated with unpleasantness, and there occurred a low score for white for either ugly or pretty pyramids.

TABLE 7: KENDALL'S RANK CORRELATION

Comparison / GROUP	P/P				U/P			
	1 & 2	2 & 3	3 & 4	1 & 4	1 & 2	2 & 3	3 & 4	1 & 4
A K	.395	.438	.548	.510	.525	.365 (2)	.691	.699
B K	.645	.624	.382	.428	.588	.608	.564	.532
C K	.667	.325 (2)	.444	.556	.634	.662	.590	.614
D K	.525	.478	.534	.411	.538	.607	.419	.436
E K	.449	.607	.550	.570	.611	.647	.519	.636
F K	.499	.446	.437	.227 (1)	.497	.584	.350 (2)	.317 (2)

(1) Not significant at .05 level (non directional test)
(2) Not significant at .01 level

In Group B (Beginners in art) there were few consistent associations but the following colours scored significantly as "pretty/pleasant" as with Group A. There was a tendency to associate browns and black with ugliness; Blue 2 and 3 had low ugly choices on all testings, whereas Grey and white were chosen significantly for prettiness. Blue 4 exhibited an upward trend over time. For pretty colours, there was a decline in rank correlation over testings, whereas for ugly colours, the coefficient stayed around .5 to .6 level. Subjects probably have a more stable association with "ugly/unpleasant" colours than with "pretty/pleasant" colours. This was also indicated by the higher number of significant ugly scores over all testings (44) than pretty scores (39). Groups of artists seem to have chosen more colours as significantly consistently pretty than other groups and these colours show a trend towards the saturated and bright colours. This observation could lead to a tentative conclusion that student artists seem to determine more easily the "feeling tone" of a colour than other subjects, except for Group E (Autogenic Trainees) which appear to show more discrimination. Preference for saturated and bright colours could have a socio-symbolical explanation.

Group C (students in Science) exhibited an even more marked difference in the number of significantly

ugly scores over all testings (49 vs 34), Blue 4, Blue 3, Green 4, Green 3 and Green 2 all had significantly low unpleasant associations over all testings but were not frequently associated with pleasantness in a consistent manner. Brown 2, Violet 3 and Black had significantly ugly scores on most testings. Again, as with Group B, the rank correlation for pretty colours tended to decrease over time but hold fairly constant ugly scores. These two groups (B and C), being first year students and generally younger in age, demonstrated a wider colour choice range than other groups for ugly pyramids.

Group D (non-students) exhibited hardly any significant consistent choices for any colour value, though on the last testings, Brown was consistently associated with unpleasantness. There were several apparently extreme colour choices over testings, but they were statistically significant (e.g., blue 4. red 1, green 1, purple 2,...). As with the preceeding groups there were, for all testings, more significant ugly scores (44) than pretty scores (19). Rank correlation values for pretty colours were stable around .5, ugly colour coefficients varied more, i.e., the group was less sure as to what constituted an ugly colour. For individual colour values on all testings, Blue 3 had low ugly scores. White tended to increase in terms of prettiness, and there occurred on the 4th testing a sudden drop in Orange 1

scores for both ugly and pretty pyramids which cannot be explained clearly since many uncontrollable factors could have interfered (seasonal changes, for example). Black had ugly associations on all testings.

Black was also significantly associated with ugliness or unpleasant feelings for Group E (Autogenic Training beginners). The same occurred for Brown 2, Red 2 and Yellow 1 had significantly pretty scores on all testings, but consistently ugly scores did not materialise except on testing 3. Over all testings, there were 39 significantly ugly scores and 35 significant pretty scores. Rank correlation increased over time for pretty colours whereas for ugly, it was both at a higher level and more stable at around .6 level. It appears that autogenic Group (E) seem to have a higher degree of discriminative reactivity as far as the prettiness or ugliness of the selected colours are concerned. It is also possible that Ss seeking this type of training may indicate an hypersensitivity which leads them to discriminate more than other groups, but this would demand a different type of study. On all testings, Blue 3, Green 3, Orange 2 and White had low ugly scores, and Grey, Brown 1 and Brown 2 had low pretty scores. Yellow 1 was increasingly chosen over time for prettiness; this finding is in concordance with similar observations

reported by H. Wallnöfer who has used the Luscher Color Test with Autogenic trainees (Wallnöfer, 1964).

Like Group E, Group F (simulated exercises) has not shown much difference between the number of significant pretty scores (28) and ugly scores (30). For the first 3 testings, Black was chosen consistently for ugliness and was a significantly high scorer for ugliness on the final testing. The final testing also saw a considerable drop in white and grey scores for both prettiness and ugliness. Over time, there was a tendency for increased yellow pleasant scores, similarly to the Autogenic Group (E). Violet 3 was infrequently chosen for prettiness on the last 3 testings. Here it is of interest to observe that the common choice of yellow as increasingly pretty by both groups (E and F) who were using relaxation approaches (i.e. Autogenic Training; simple rest periods) shows a tendency which could warrant further research in relationship to dynamics and positive feelings. For both pretty and ugly scores, the rank correlation coefficient was fairly stable, except that between testing 1 and 4, it was low (not significant at .05 level).

A person's discriminative reactivity in selecting "pleasant" and "unpleasant" chromatic and achromatic stimuli changes the course of studies in Art in the same manner as during practice of brief mental exercises of

passive concentration on psychophysiologically adapted stimuli (Autogenic Standard Exercise) which are unrelated to colour perception.

b) - Were there differences in colour choices between groups? and over time? Group E/F: The null hypothesis that was tested was that there is no significant difference between colour scores between scores of the Autogenic Group and the group practicing simulated exercises (i.e., simple rest periods, eyes closed). Over all testings, there were 15 significant differences on pretty pyramids and 6 for ugly pyramids, i.e. greater agreement existed between the two groups on what constituted an ugly colour. For "pleasant" pyramids, Group E (AT beginners) has chosen black more often on the first three testings, despite a downward trend in its choices over time. This downward trend could indicate a clinical improvement by decrease in choice of black, but this cannot be asserted without further controls. Group E (AT beginners) also markedly preferred Red 2 on all testings, exhibiting this time an upward trend. It would have to be determined if the displacement of black goes in the direction of red, such possibilities have been discussed in other clinical research on the interpretation of colour choices (Luscher 1969, Schaie and Heiss 1964). For ugly pyramids on the 1st and 3rd testings, there were no significant differences at all.

Only on testing 4, after 16 weeks did significant preference occur: the control group F (simulated exercises) showed a greater preference for Green 3 and Blue whereas Group E(AT beginners) has a significant preference for White. However, significant differences (21) were not sufficient to reject the null hypothesis.

Group E/A: Comparing advanced artists (A) and AT beginners (E) there occurred 22 significant pretty differences and 17 ugly differences indicating a greater agreement existed as to what constitutes an ugly colour. On pretty scores, except for testing 2, Group E chose Red 2 more often over all testings. Group E's Red 2 scores had a slight upward trend, whereas Group A has a slight downward trend. A similar result is observed for white, though in both cases, the trend was downwards. Also on testing 2 and 4, Group E chose Red 1 more frequently. For ugly pyramids, Group A chose Red 1, 3 and 4 more often than Group E. As with pretty pyramids, Group E chose more white than Group A.

Group E/B: It was important to determine if there was any significant differences between colour scores of these two groups in order to verify possibilities of influences in Art training and Autogenic Training. 12 comparisons out of a possible 96 (4 testings and 24 colours) yielded results not rejecting the null hypothesis, since there was hardly any differences in choices. Group E(AT beginners chose Red 2 more often than Group A on 3 and 4,

Group B's upward trend in Blue 4 was significantly different. The same number of significant differences occurred in the final testing, there being none in the 3rd. Again, there was little difference in the unpleasant scores. Group E(AT beginners) repeatedly scored higher on black choices over all testings and Group B chose Red 3 more frequently than Group E on all testings.

Group C, D, G and H: Due to lack of reasonable time and costly computerization, the calculation of differences between these groups and the initial group E(AT beginners) had to be omitted. However a comparison of raw data indicated that there were no particular differences which could change the general trend of our findings.

A person's discriminative reactivity in selecting "pleasant" and "unpleasant" chromatic and achromatic stimuli changes during the course of studies in Art in the same manner as during the regular practice of brief mental exercises of passive concentration on psychophysiologically adapted stimuli (Autogenic Standard Exercise) which are unrelated to colour perception.

c) - Is there a light/dark dichotomy for pleasant and unpleasant colours? An arbitrary classification of colour values was made to see if "darkness" or "lightness" was related to "prettiness(pleasantness)" or "ugliness (unpleasantness)". The following assignment was made:

DARK		LIGHT	
Blue	4	Blue	1
Red	4	Red	1
Green	4	Green	1
Yellow	2	Yellow	1
Violet	3	Violet	1
Orange	2	Orange	1
Brown	2	Brown	1
Black		White	

Thus out of 24 colours a third are classified "dark", a third "light" and the remainder is unclassified. Since 45 colours are chosen to make pretty and ugly pyramids, we might expect, with random sampling, the following mean scores:

	PRETTY	UGLY	TOTAL
Dark	15	15	30
Light	15	15	30
Total	30	30	60

If, however, there was a consistent relationship between "pleasantness" and "lightness" and "ugliness" and "darkness", we might get results like this:

	PRETTY	UGLY	TOTAL
Dark	1	29	30
Light	28	2	30
Total	29	31	60

This could be translated into chart form as the following:

TABLE: 8: CHI-SQUARED RESULTS (1)

Dark/Light Scores

GROUP	TESTING			
	1	2	3	4
A	.301	1.243	0.014	0.002
B	1.875	0.159	0.433	0.892
C	1.580	5.805 (2)	8.450 (2)	2.583
D	0.645	0.010	1.278	0.270
E	0.372	1.340	4.711 (2)	1.318
F	1.056	0.006	1.087	3.648

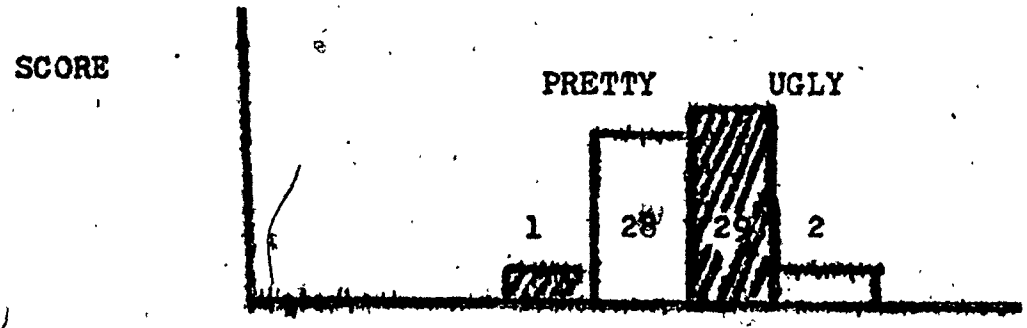
(1) Refer to technical Appendix 3

$x^2_{.95} = 3.84$ (one-tailed) for 1 degree of freedom

(2) Significant at .05 level

TABLE 9 SIGNIFICANT, CONSISTENT COLOUR CHOICES

GROUP	PRETTY				UGLY			
	1	2	3	4	1	2	3	4
A	green 1 yellow 1 violet 1 orange 1	-	yellow 2	-	black	red 1	-	red 1
B	yellow 2 violet 2 brown 2	green 3 violet 2 orange 2	green 3	-	brown 1	black brown 1 brown 2	grey brown 2	black brown 1
C	green 3	-	-	orange 2	violet 3 brown 2	green 4 brown 2 brown 2 black	brown 1 violet 3 brown 2 black.	violet 3 black
D	-	yellow 2	-	blue 4	-	brown 2	brown 2	brown 2
E	-	red 2	yellow 1	-	-	brown 2 black	-	brown 2 black
F	-	-	green 3 yellow 1	-	black	black	black	-



Converse logic would result in the two inner columns being swapped for the two outer columns. Matrices like the above may be readily tested for significance for consistent association using Chi-squared (see Technical Appendix 3).

The results of such computations are shown in Table 8 of a total of 24 comparisons, 3 were significant at .05 with Group C(Science students) and group F(AT beginners), in which darkness was associated with "ugly/unpleasantness". In general. pleasantness is associated with lightness, and unpleasantness with darkness, but this conclusion is tenuous at best and warrants further analysis.

E. Conclusions

Even though individuals appeared to have a consistent idea of what constituted a pretty or an ugly colour, as a group it is not as evident (See Table 9). It would seem that only yellow was consistently rated as pretty, followed by Green 3. A greater measure of agreement existed in ugly colours. Black, Brown 1 and Brown 2 being preferred for the ugly set. Out of 24 colours these 5

choices show a definite tendency. Preference for yellow and green, here, seems to be inverted results from J.P. Guilford's preference curve for North American preferences. Table 10 shows the total number of consistent choices by colours, over all groups and all testings. This table gives a more quantitative feel of the lack of agreement as to what constitutes prettiness or ugliness: out of 4 testings for 6 groups, 10 colours did not get one consistent statistically significant choice, and 15 got 2 or less. Table 10 indicates however, that there were more significant ugly choices (237) than pretty choices (187).

Intergroup comparisons yield unconclusive results (See Tables 11 and 12). On each testing 24 comparisons are made for pretty and ugly pyramids - the highest number of differences (7) occurred on the 4th testing between Groups E(AT beginners) and Group A(Advanced artists); Group E(AT beginners) and F(simulated exercises) on testing 1 and 3, in the ugly pyramids had no significant differences and only 6 significant differences were discovered over all testings on pretty pyramids. There were 15 significant differences out of 96 possibilities (4 testings of 24 comparisons) which is less than 20%. By far the greater number of significant differences occurred for both pretty and ugly pyramids between Group E(AT beginners) and Group A(advanced artists).

TABLE 10: COLOUR CHOICE SUMMARY

OVER ALL GROUPS, ALL TESTINGS

Colour Name		Number of Consistent choices(1)	No. of Significant Choices		
			PRETTY	UGLY	TOTAL
BLUE	4	0	8	2	10
	3	0	0	19	19
	2	0	3	11	14
	1	0	4	8	12
RED	4	1	15	5	20
	3	0	10	13	23
	2	0	5	9	14
	1	2	6	3	9
GREEN	4	1	9	8	17
	3	4	6	19	25
	2	0	0	13	13
	1	1	2	3	5
YELLOW	2	3	7	13	20
	1	3	9	9	18
VIOLET	3	3	13	4	17
	2	3	3	10	13
	1	0	9	4	13
ORANGE	2	5	6	17	23
	1	0	1	16	17
BROWN	2	9	16	11	27
	1	4	15	5	20
BLACK		12	14	21	35
GREY		9	18	8	26
WHITE		0	8	5	13
TOTAL		52	187	237	424

(1) A consistent color choice is high prettiness combined with low ugliness or vice versa, statistically significant at 05 or better (2 tailed test).

TABLE 11: SUMMARY OF SIGNIFICANT DIFFERENCES

BETWEEN GROUPS(1)

- Pretty pyramids -

TESTING	Between: E & F		E & A		E & B	
	N	Colours	N	Colours	N	Colours
1	2	red 2, black	7	blue 4, red 2 green 4, green 1 orange 2, black white	4	red 2, violet 1 orange 2, white
2	6	red 2, green 4 green 2, violet 2 brown 2, black	4	red 1, violet 3	2	yellow 1 violet 2
3	3	blue 1, red 2, black	4	red 2, yellow 1, violet 2, white	3	blue 4 blue 1 red 3
4	4	blue 1, red 2, black	7	red 1, red 2, green 3, orange 2 brown 1, Grey, white	3	blue 4 red 2 red 1
T	15		22		12	

N - number of significantly different scores.
better than .05, two tailed test.
NB: underlined color means E score greatest.

TABLE 12: SUMMARY OF SIGNIFICANT DIFFERENCES

BETWEEN GROUPS

- Ugly pyramids -

TESTING	Between: E & F		E & A		E & B	
	N	Colours	N	Colours	N	Colours
1	0	-	4	red 4, red 1 <u>black</u>, <u>white</u>	4	red 4, red 3 green2, black
2	3	green 4 green 2 brown 2	5	red 3, green 4 green 1, <u>brown 2</u> <u>white</u>	2	red 4 green 4
3	0	-	3	blue 1, red 3, <u>black</u>	0	-
4	3	blue 4 green 3 <u>white</u>	5	red 4, red 3, green 4, grey, <u>white</u>	6	red 3, green 3 brown 1, <u>black</u> grey, <u>white</u>
T.	6		17		12	

N - number of significantly different scores.
(1) better than 05 two tailed test
NB: underlined color for Group D being greater

This could mean that Art training and Autogenic training may develop a different type of reactivity to colour. There is also the possibility that the sensitization achieved through Autogenic Training may be comparable to advanced art training that the sensitivity of people entering into the practice of Autogenic Training have a comparable sensitivity to colour than fully trained students in art. Such assumptions would need to be verified by further studies experimentally designed to answer these specific questions. This would also imply a greater number of subjects and a stability in colour stimuli beyond the one assumed by the Color Pyramid Test (CPT).

It is interesting to note that correlation comparisons (See Table 7) all yielded positive correlations, most of them statistically significant. The highest correlation in Group A between testing 1 and 4 of the ugly pyramids was 0.699. This is interesting because, if one assumes some changes occurred at all, they would probably show up most clearly between the first and the fourth testing. It is also noteworthy that ratio correlation tends to be highest for ugly scores.

CORR. COEF. Range	FREQUENCY Pretty	Ugly
.2 - .295	1	0
.3 - .395	3	3
.4 - .495	9	3
.5 - .595	7	8
.6 - .695	4	10
Total	24	24

Thus, in general, groups had a more stable ranking of ugly colours. As for dark/light dichotomy, we might conclude that pleasantness is associated with lightness, and that darkness is unpleasant, but this conclusion warrants analysis.

F. Implication for Art Education

Findings in this research should not be examined in the light of specific choices from which symbolic or clinical interpretation could be made but rather as an exploratory study on the general patterns of discriminative reactivity to colour. In certain respects, the negative results in this experiment appear to support in parts J.P. Guilford's position that "colour preference in man is innately determined and is little influenced by the environment or learning experience" (Schaie and

Heiss 1964). A better discrimination seems to exist for "unpleasant" colours and the population generally associates dark colours with unpleasantness and light colours with pleasantness. Autogenic Trainees appear to have more stability in their choices while Art students show a wider range in choices. However, colour choices, according to this research, appear to remain over time and from one group to another an individualistic and fluctuating reaction difficult to measure quantitatively.

It could very well be that formal teaching of colour perception does not have any impact on an individual or on a group's colour choices and in some way detracts from a spontaneous experience in colour, creating a rational option by opposition to a natural spontaneous reaction. Exercises in colour notations and systems are useful objective tasks but they do not replace the practical search for personal colours if one wants to achieve a whole self expression. During the course of testings (verbal comments, attitudes while performing task, reaction to the stimuli) artists groups (A and B) did show unsustained discrimination for some colours (Browns, Greens, Purples) or extreme judgements (Pink being unpleasant) and associating the same value with "pleasantness" and "unpleasantness", reversing the trend from one testing to another (See appendix colour charts).

They would verbalise their favorite colour arrangements but on the test itself would explain their choices (specially monochromatic, achromatic and dark colours) with theoretical phrases which were apparently the direct product of classroom experiences: complementarity, fashionable trends, recent assignments, color field theories, art history references, etc...). What is interesting though is the fact that on the whole of the experiment, in spite of this training, art students do not differ drastically from other groups. But their attitude could be tentatively explained by their experiences in aesthetic possibilities, openess to the elements and the general exploratory - attitudes given in fine arts training. In this case, colour judgements become the result of an educated eye slightly removed from the notion of "pretty" and "ugly" and takes aspects of dosage and control, but when it comes to discriminate between two poles Autogenic Trainees exhibited greater discrimination and were more progressive in their choices over time; other control groups showed less reactivity and younger groups (B and C) seemed less concentrated around certain choices than others, maybe indicating a greater availability to changes than others.

It was observed that artist groups and autogenic trainees groups appear to display a different reactivity and combination of the two trainings could allow a fuller

experience. In the light of findings made through this experiment, it could be interesting to relate Autogenic Training to art teaching situations, this sensitizing approach and relaxation technique appears to enhance creativity and perception in a different manner than direct application of artistic principles and could be used as a preparatory approach just as the sportsman uses warming up exercises, the artist could use autogenic approaches to calm down, slow down and regulate his pace to help reach a state of mind related to his inner needs for expression so attaining a more complete experience in colour, form, dynamics, brightness (Luthe 1969, non-clinical applications of Autogenic Therapy, Vol.III).

Another interesting point in this experiment is that the groups in general have shown a greater agreement on what constitutes an "ugly/unpleasant" colour than on a "pretty/pleasant" colour (except for advanced artist students who seemed to be more certain of their pleasant choices). From this observation, it appears that Ss can express more clearly their opinion on negative feelings when it comes to colours. For expression-shy persons usually suffering from a certain blocage, it could be interesting to give assignments expressing "unpleasant/ugly" feelings through colours allowing this aspect to be expressed first and progressively working towards a more

positive and open expression. This information is valuable for art therapy situations as well as in a more general context of art education.

Similarly, it was observed that darkness is generally associated with "unpleasant" feelings (tiredness, anxiety fear, agression, repulsion etc...) while lightness in colour values are generally associated with "pleasant" feelings (relief, joy, tranquility, peace, cheerfulness, activity, etc...). This confirmation of a well known fact supports works of environmentalists and psychologists when it is necessary to create certain mood reactions or to prevent, forecast or counteract others. For example, one can counteract negative feelings and bring a certain amount of support to positive attitudes by the colours chosen for clothing and interior decoration. Systematic application of favorite colours bright, soft or light in periods of depressive of negative thinking appear to result in a positive integration while if darker colours or more greyish colours are used during these periods, negative integration appears to take place. However such assertion would need further evaluation. Careful study of the change factor is to be taken into consideration when it comes to colour studies. Clinically oriented persons may find interesting the observation that Autogenic Training seem to affect the choices in colours showing a consistent and increasing preference for yellow and bright red during the course

of the training while preference for black diminishes as a pleasant colour to become discriminately unpleasant after several weeks of regular practice of the training. It is not the task of this study to interpret these facts in the light of psychological interpretation but it is certainly indicating a general direction of the training's influence.

It is not within the scope of this study either to make a criticism of psychological tests on colour. These tests (e.g. Luscher Color Test, Color Pyramid Test) are devised as measuring tools which could be helpful indicators of suspected pathology in a clinical situation. Unfortunately, these tests are often used by teachers and students in art to discover from an intellectual approach their personal colours, in lieu of an experiential search and a visual discovery. This practice should be discouraged. Even as clinical tools these tests are often criticized for their general and unconclusive interpretations and the limits of their colour control (Grünholz 1971, Schmiedecke-Kauman and Dahl 1971, Burdick 1969, Fornari de Aguire and Mejias 1968, Hooke and Schaie 1968, Van de Ven 1967, Höger 1966, Saavedra 1965, Gentili 1965).

G. Limitations and Recommendations

Exploratory research does not necessarily aim at information which can be directly applicable. The role

of a basic research is to gather facts and relate them to other findings in the hope of opening up to new speculations for discovery. Interpretations and applications of data are usually left to more pragmatic works. However, this thesis indicates trends which can be meaningful information to art educators, art therapists, clinical psychologists and environmentalists.

This investigation indicates the difficulty of quantifying the emotional impact of colours on individuals and groups. This task was attempted with partial success by advertising companies. There exists many uncontrollable factors and phenomenological report, descriptive or semi-experimental approach appear to be preferable techniques (Matthaei 1969, Siegel 1969).

A reasonable control was applied (light, location, time, age, occupation, socio-cultural background, sex, religious education), but emotional factors (moodstate, affect, case history and perceptual variations (e.g. colour-blindness)) could not be verified within reason.

A semantic differentiation test was applied concurrently in an attempt to give more information on what Ss considered "pleasantness" (pretty) and "unpleasantness" (ugly) in colours and dynamics in the pyramid. Incomplete data did not permit to gather valid information beyond the general positive/negative notion

implied by the stimulus given in the protocole of the Color Pyramid Test (CPT). This could be the object of another study related more specifically to the Color Pyramid Test. This test was preferred to others (Rorschach, Luscher, Fansworth-Munsell, Dvorine Pseudo-isochromatic plates, Inter-society Color Council Test) because it was a validated instrument measuring colour and personality. Devising a new colour set would have created reliability problems. However, the Color Pyramid Test CPT does not prowe to be a useful tool when one wants to go beyond a general choice of colours. If one wants to interpret data in terms of hue, value and chroma, the lack of uniformity in the colour scale makes it difficult to establish stability of material (See Table 5).
J. Burdick (1969) recommends a more unified colour choice and a neutral grey background. Psychological tests are devised to measure certain aspects of human behaviour and are taking colours from an intellectual point of view and the visual consideration experienced by artists are not included and somewhat distorts the use of it with art students; group A and B were critical of the restricted amount of colours and the impossibility to achieve subtle gradations, mainly because of the instability of colour values. They also criticized the rigidity of the pyramid form, more particularly its symetrical inflexible structure.

allowing little creative possibilities. One can conclude that such test might not have been the ideal tool to measure artistic possibilities. On the other hand it was not the first aim of this study.

In terms of statistics, this experiment would have gained in reliability by increasing the N of Ss from 15 to 25 and simplifying and reducing the number of groups. When dealing with such mobile topics, the necessity of meticulous control of factors cannot be underestimated and this should be reflected in careful planning of experimental designs. The most commom mistake is to plan the experiment and statistical calculation separately; It affects significance and limit possibilities of interpretation. Here again, it must be mentionned that quantitative approaches to colour problems related to human response is limited and other experimental methodology should be considered. One cannot deal with problems in colour without considering colour combinations, dosage, dynamics of the colour form and the identification of the Ss with the colour. Frequency of choices is only one aspect of the question. But the others necessitate complicated computational analyses which were not financially feasible at this time. This type of research is preferable as a group project because of its time consuming aspect. Cost: $600.00.

It became evident during the course of this study that emotional signification of colour is not necessarily in the frequency of choices of a colour but in the juxtaposition, the dosage and control of the colour choices. This could be the base of an entirely new research and which would answer some of the questions presented in this preliminary work.

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APPENDIX

TECHNICAL APPENDIX 1

1. <u>To test the significance of an observed colour score:</u>

X_i = score for subject i for a given colour

define $\bar{X}$ = sample average score

S = sample standard deviation

$$= \sqrt{\sum \left[x_i - \bar{x}\right]^2}$$

The null hypothesis is

$$H_0: \bar{X} = \mu_h = 1.875$$

where μ_h = hypothetical population mean

Compute

$$t = \frac{\bar{X} - \mu_h}{S_{\bar{x}}}$$

where

$$S_{\bar{x}} = \frac{S}{\sqrt{n-1}}$$

Test the significance of t for (n-1) degrees of freedom using Student's distribution.

2. <u>To test the significance of differences in observed scores between groups (or testings):</u>

Define n_1 = no. of subjects in Group 1
x_1 = mean of given colour for Group 1
s_1 = standard deviation of given colour for Group 1
n_2 = no. of subjects in Group 2
x_2 = mean of given colour for Group 2
s_2 = standard deviation of given colour for Group 2

The null hypothesis tested is

$$H_0 : \bar{X}_1 = \bar{X}_2$$

Then $\hat{S}$, the estimated population standard deviation

$$= \sqrt{\frac{[n_1 s_1]^2 + [n_2 s_2]^2}{n_1 + n_2 - 2}}$$

We know that the estimated variance of the difference of two means is the sum of these:

$$S_d^2 = \frac{\hat{S}^2}{n_1} + \frac{\hat{S}^2}{n_2}$$

Then

$$t = \frac{\bar{X}_1 - \bar{X}_2}{SD}$$

and t is tested for $(n_1 - n_2 - 2)$ degrees of freedom

REFERENCE: Richmond, Samuel, B.: <u>Statistical Analysis</u> (2nd ed.), Ronald Press, N.Y. (1964)

TECHNICAL APPENDIX 2

Kendall's Rank Correlation:

Use was made of the IBM packaged subroutine KRANK which computes the correlation coefficient given 2 vectors of n observations for 2 variables, A and B. Observations are ranked 1 to n. Tied observations are assigned an average of two ranks. Ranks are sorted in the sequence of cariable A.

A correlation factor for ties is:

$$T_a = \sum \frac{t(t-1)}{2} \qquad \text{for A}$$

$$T_b = \sum \frac{t(t-1)}{2} \qquad \text{for B}$$

where t number of observations tied for a given rank.

The correlation coefficient is calculated for 2 cases:

1. If T_a and T_b are zero:

$$\tau = \frac{S}{\frac{1}{2}n(n-1)}$$

n number of ranks
S total score calculated for ranks in variable B by selecting each rank in turn, adding 1 for each larger rank to its right, substracting 1 for each smaller rank to its right.

2. If T_a and/or T_b are not zero:

$$\tau = \sqrt{\tfrac{1}{2}n(n-1) - T_a \sqrt{\tfrac{1}{2}n(n-1) - T_b}}$$

The standard derivation is then computed

$$S_\sigma = \sqrt{\frac{2(2n \quad 5)}{9n(n-1)}}$$

The significance of T is measured by Z where

$$Z = \frac{\tau}{S_\sigma}$$

REFERENCE: System/360 SSP
Version III - Programme Manual
Programme 360 A-CM-03X

TECHNICAL APPENDIX 3

Chi-Squared for 2X2 Contingency Tables:

Represent cell and marginal frequencies as follows

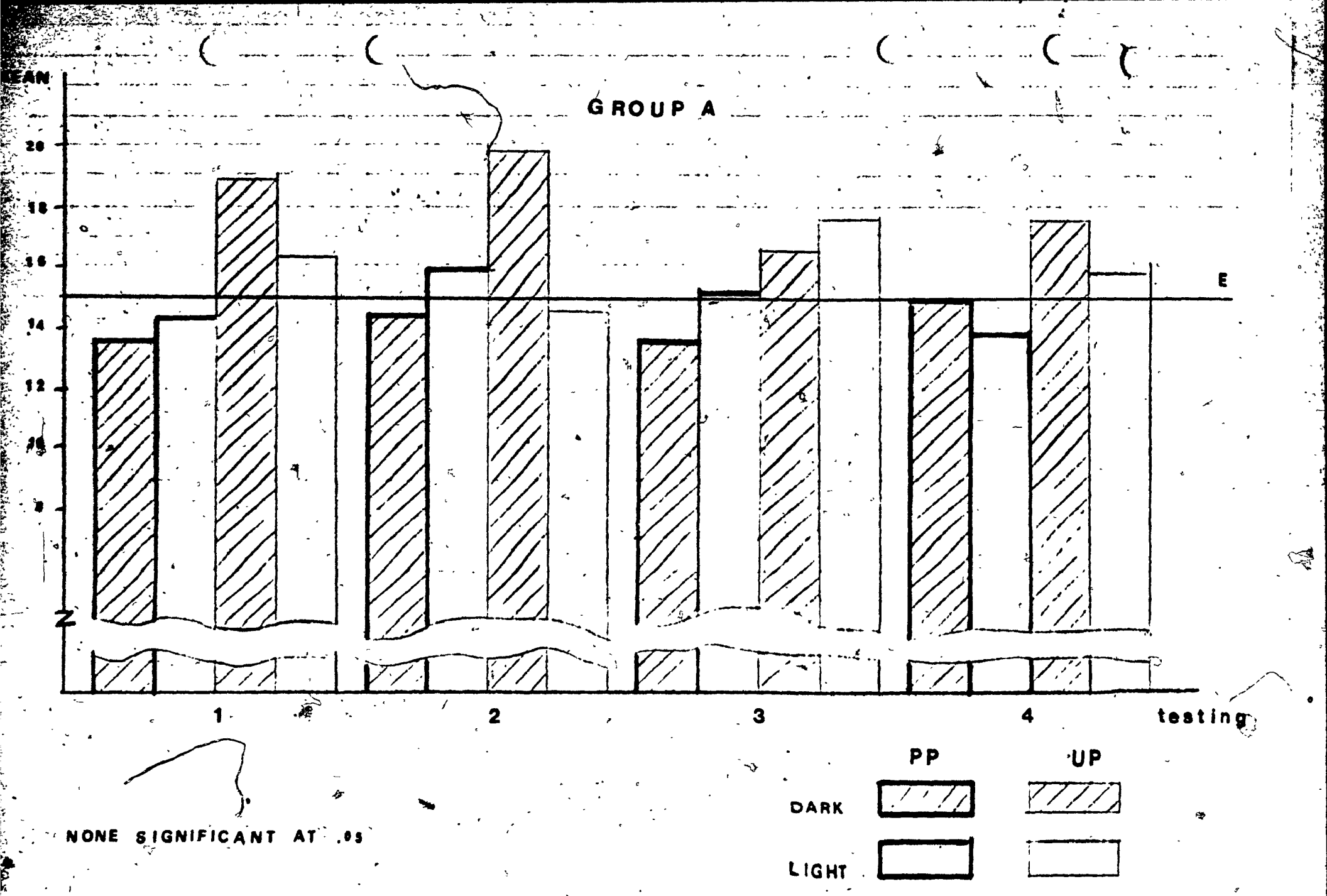
A	B	A + B
C	D	C + D
A + C	B + D	n

Then

$$X = \frac{n\,(AD - BC)^2}{(A + C)\,(B + D)\,(C + D)\,(A + B)}$$

for 1 degree of freedom

REFERENCE: Ferguson, G.A.: "Statistical Analysis in Psychology and Education" Mc Graw-Hill(3rd ed), 1971



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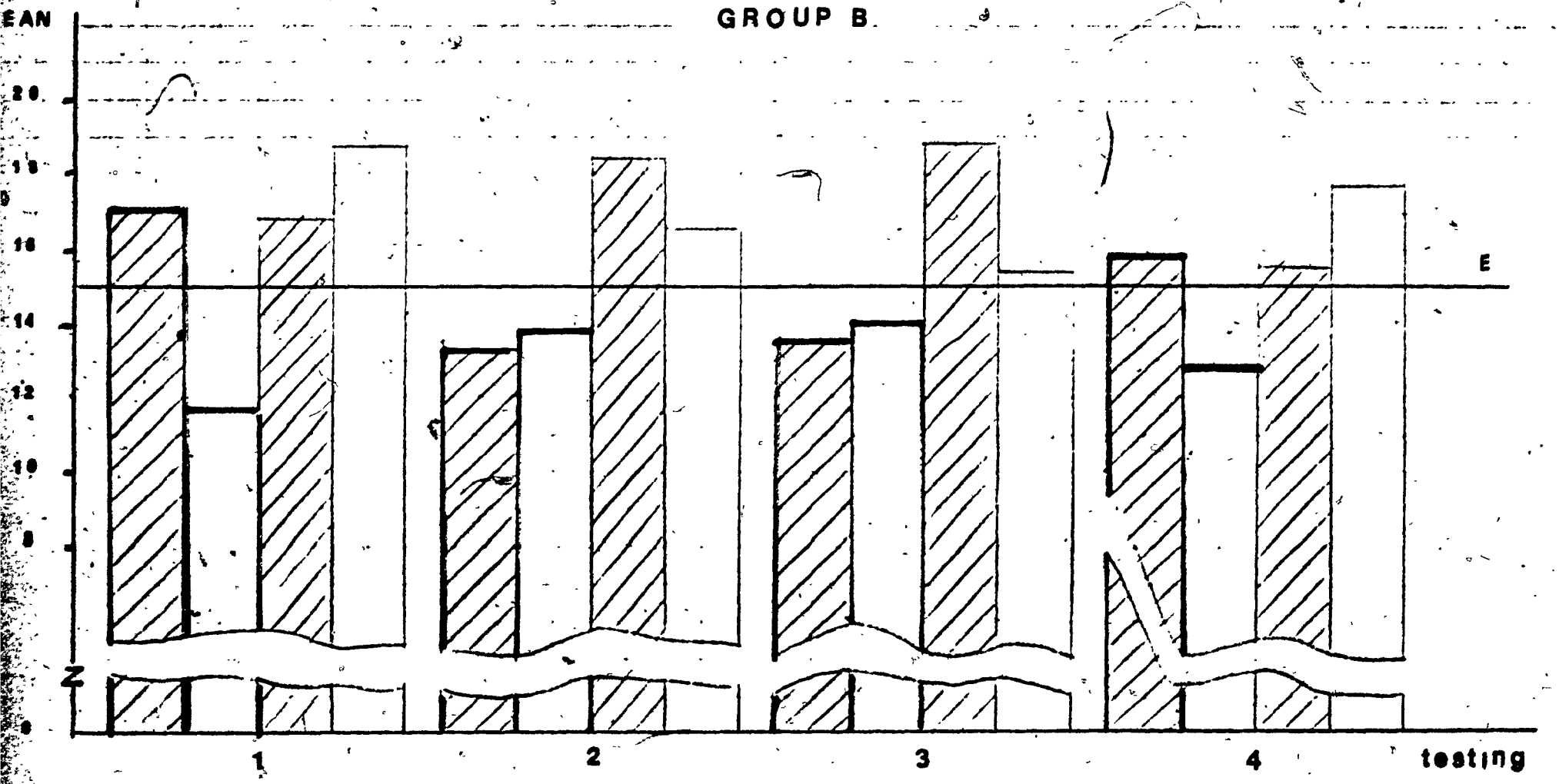

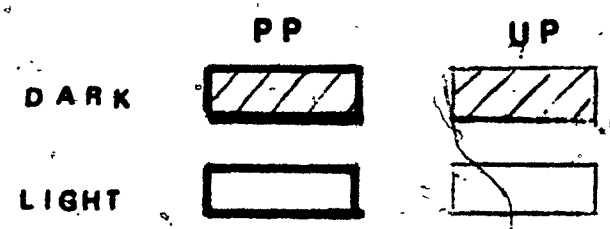

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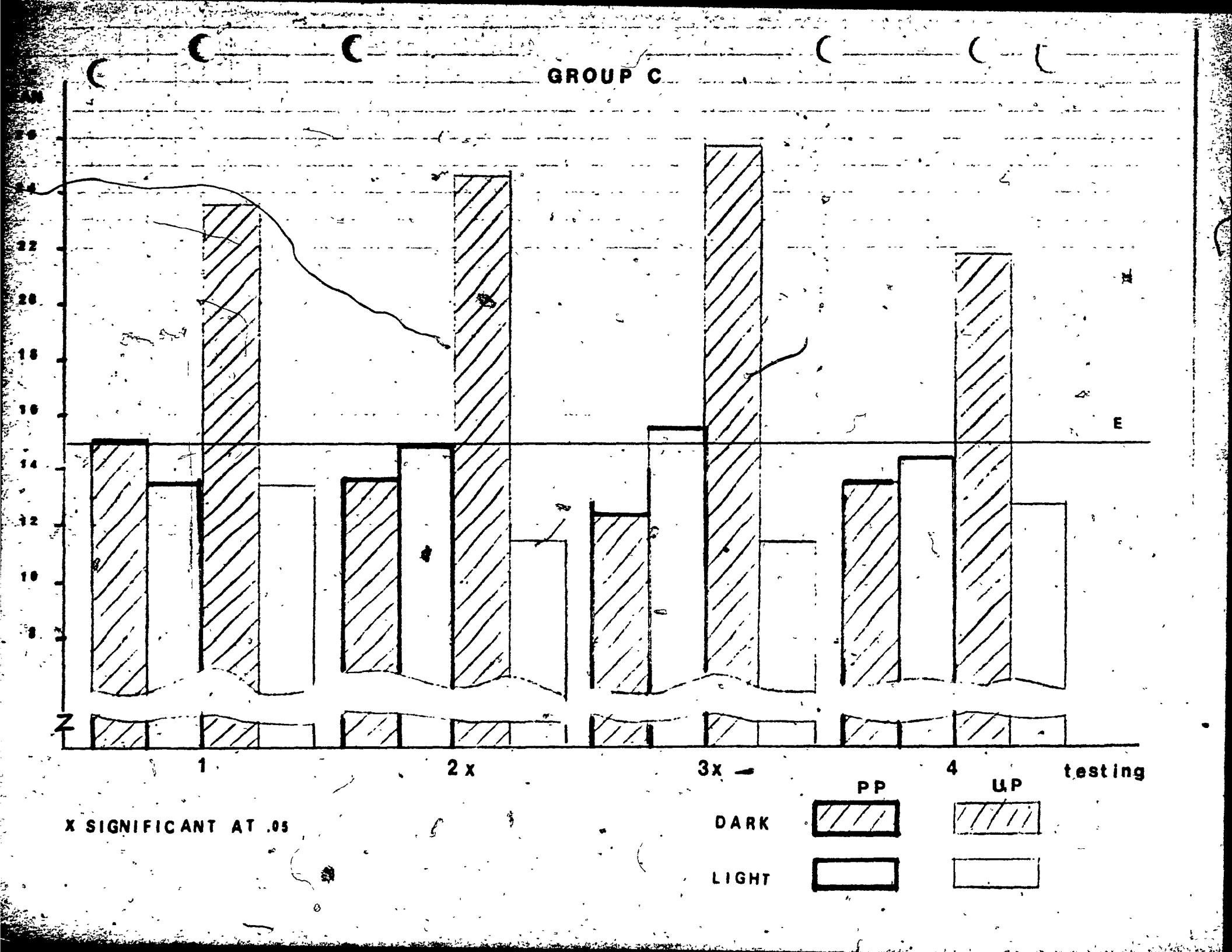
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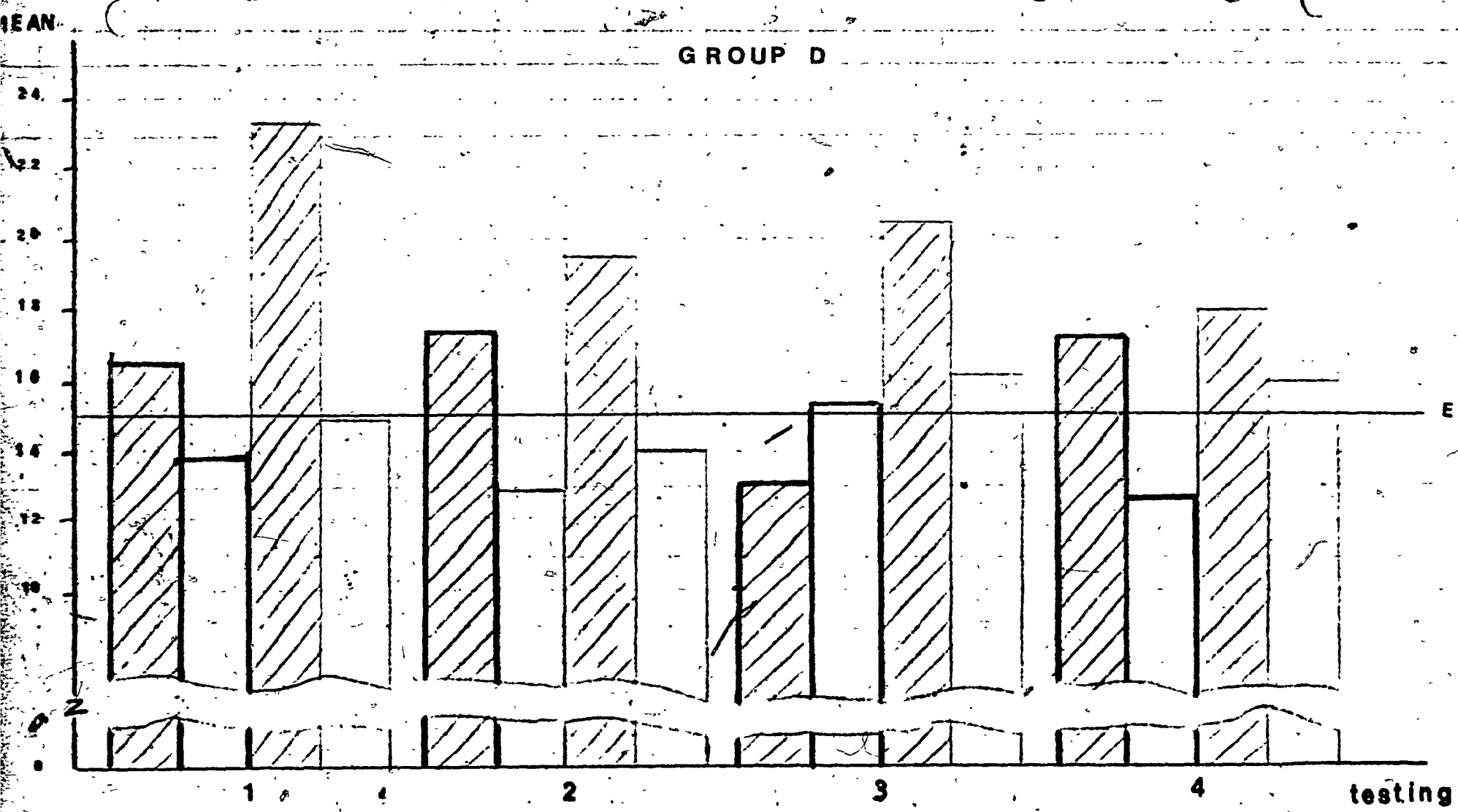
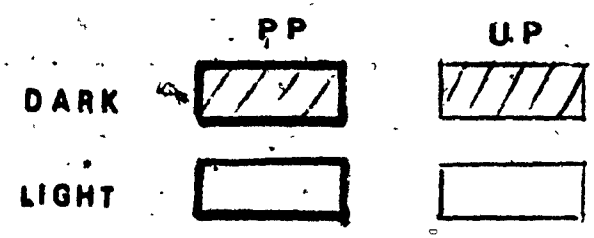
X SIGNIFICANT AT .05





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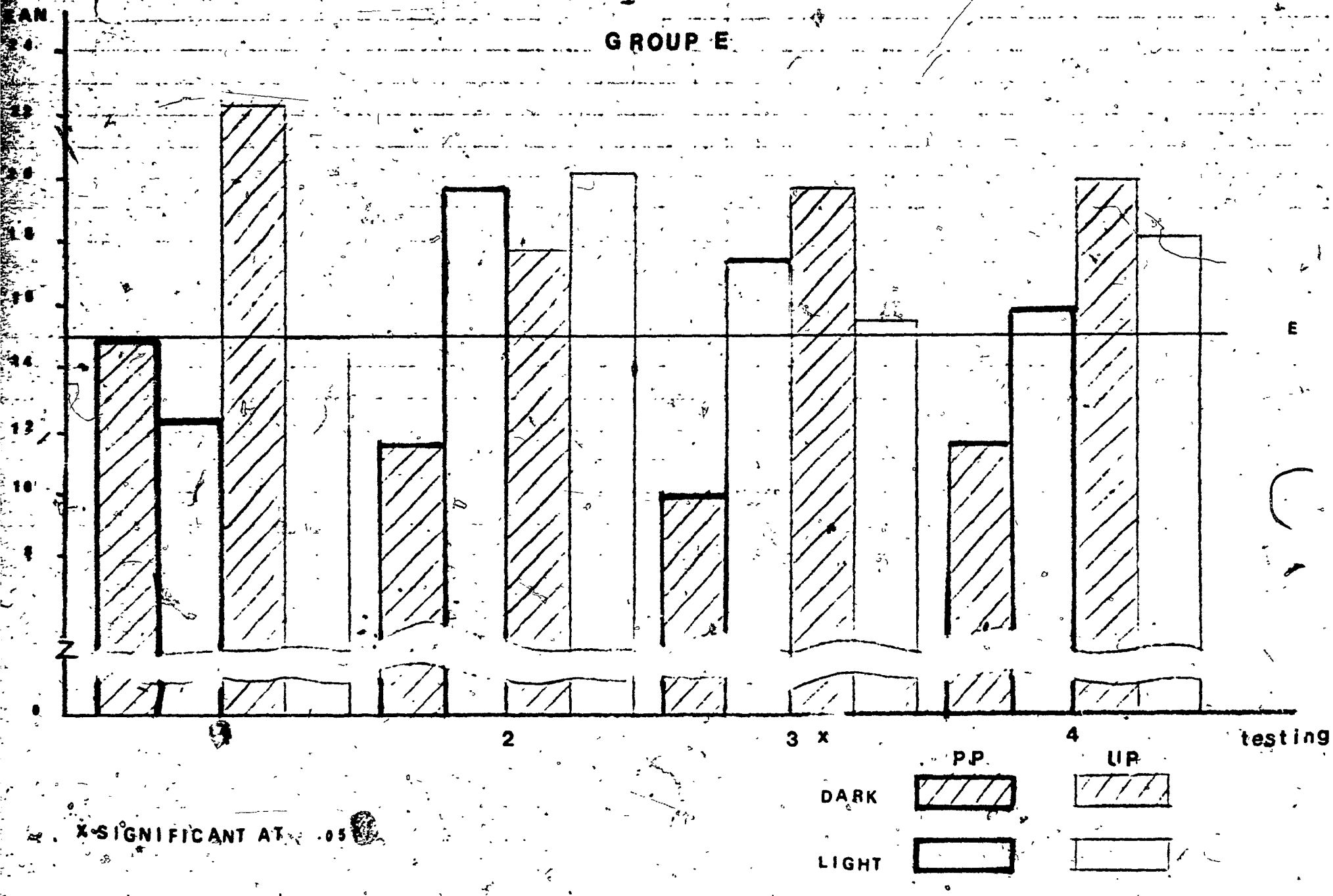
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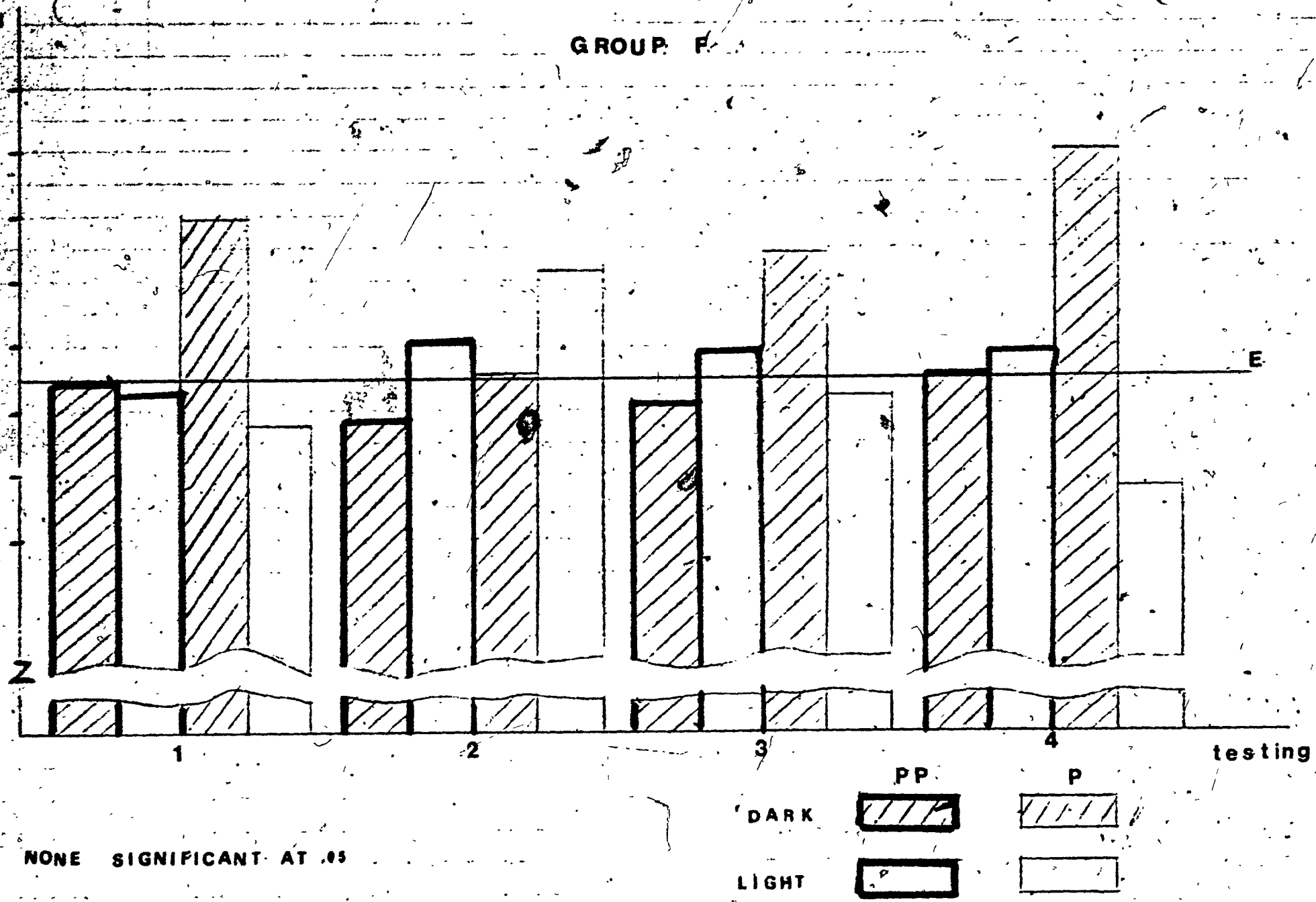
x SIGNIFICANT AT .05



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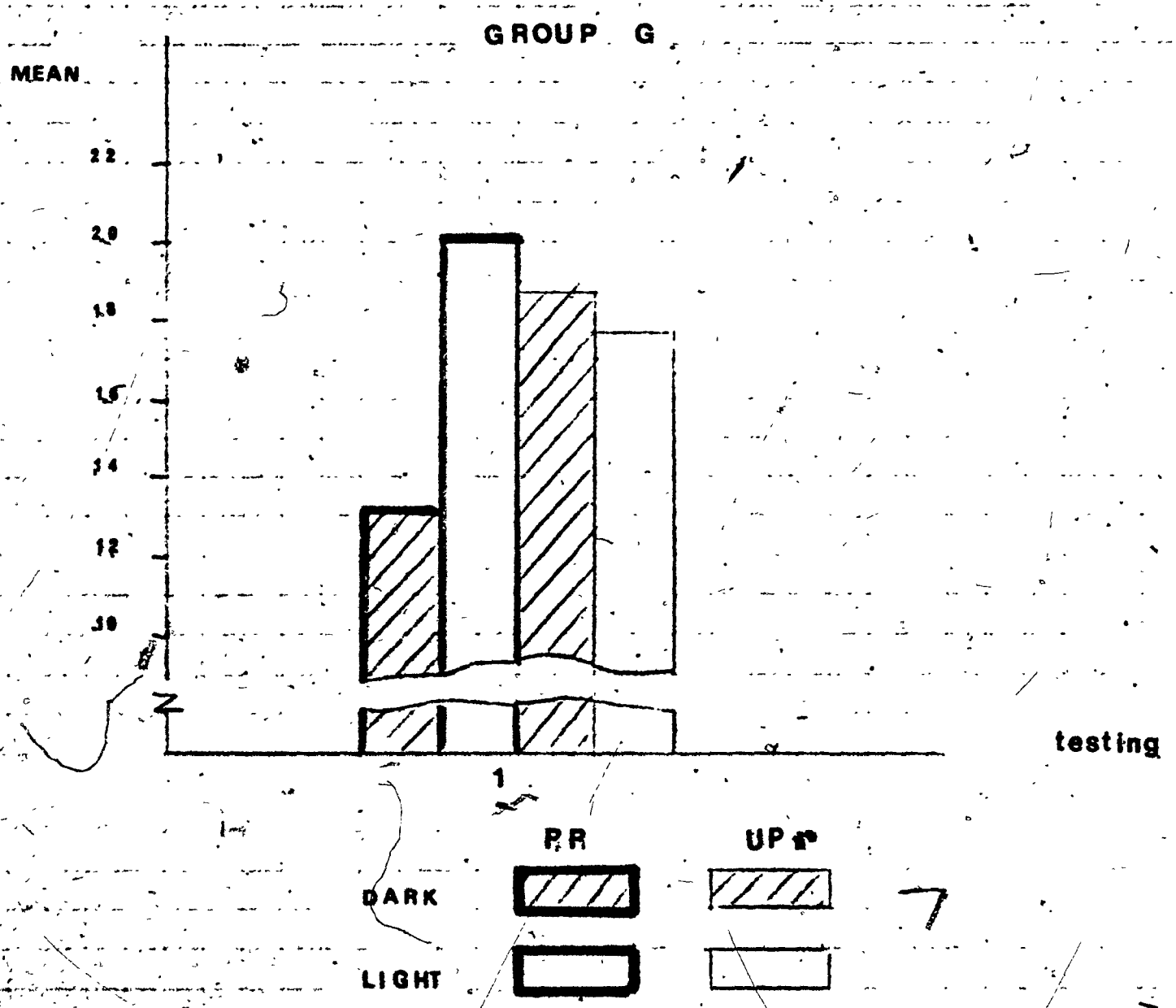

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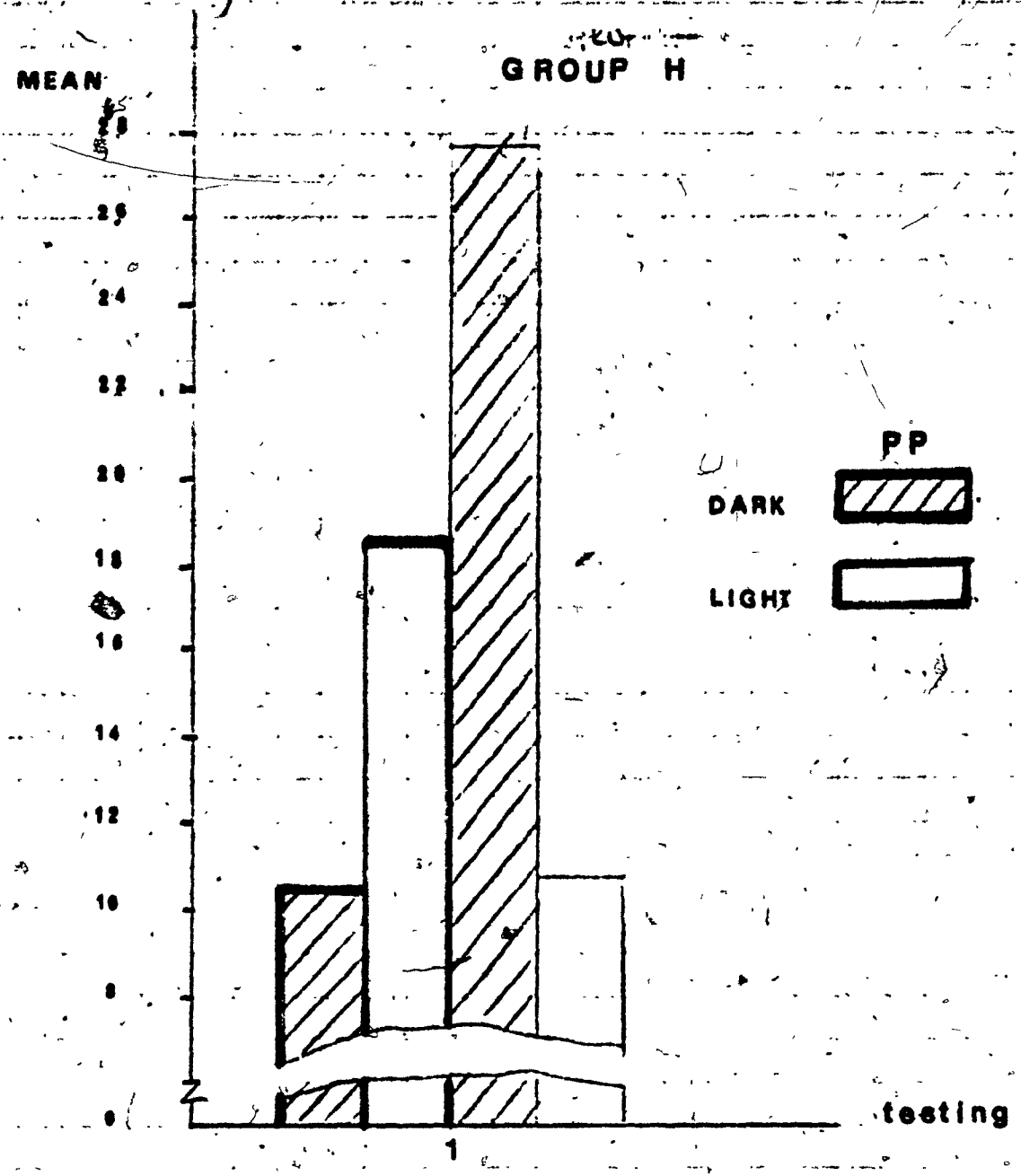

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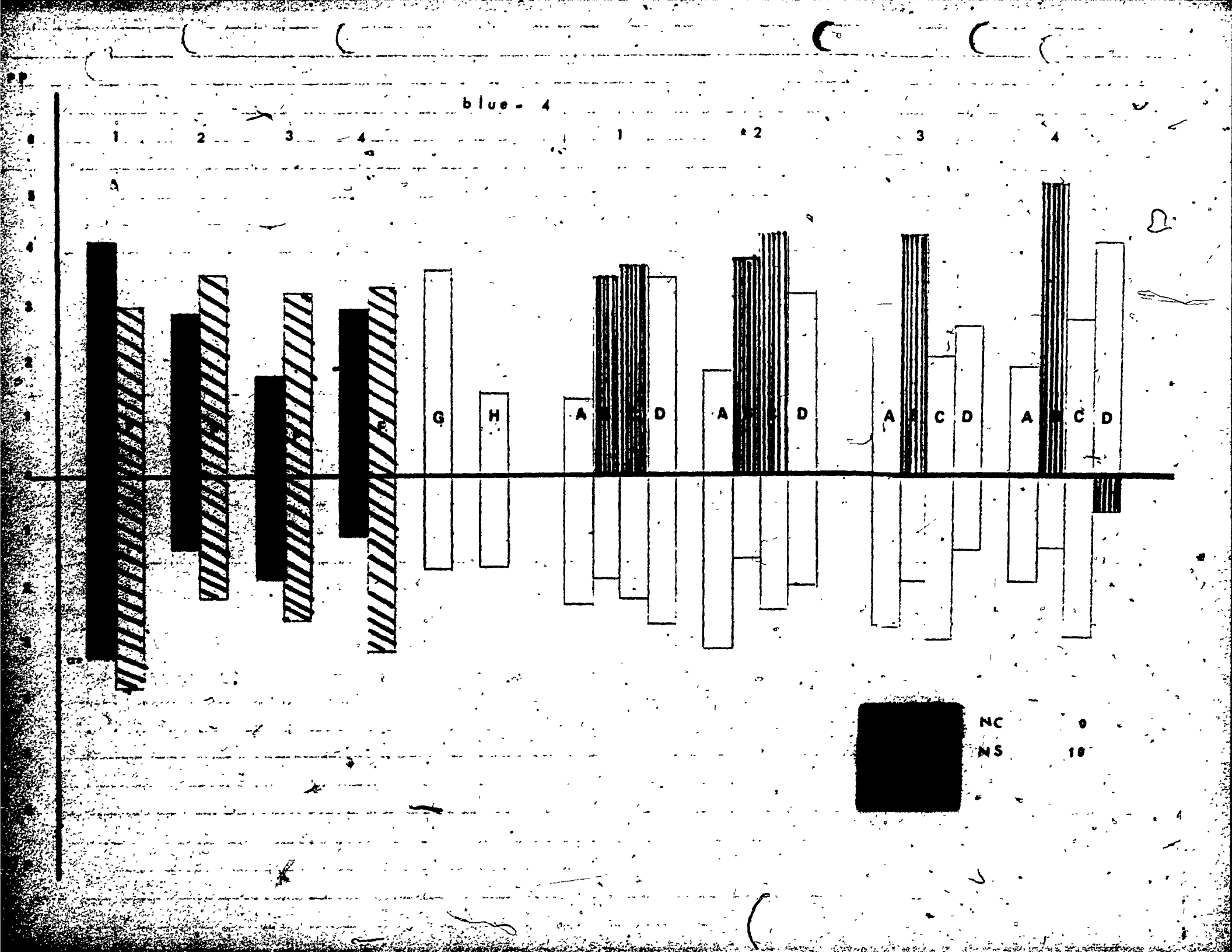
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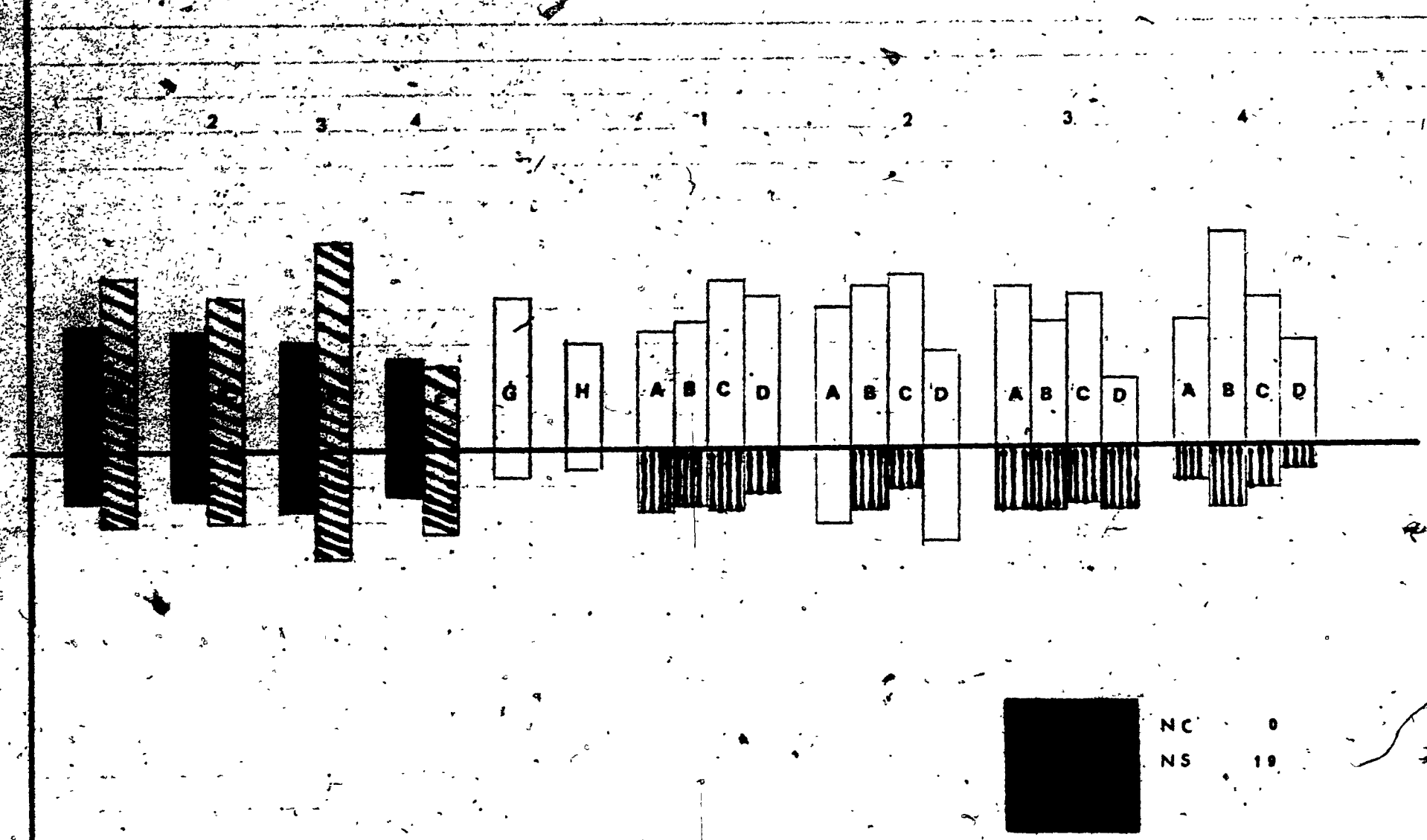
blue 3



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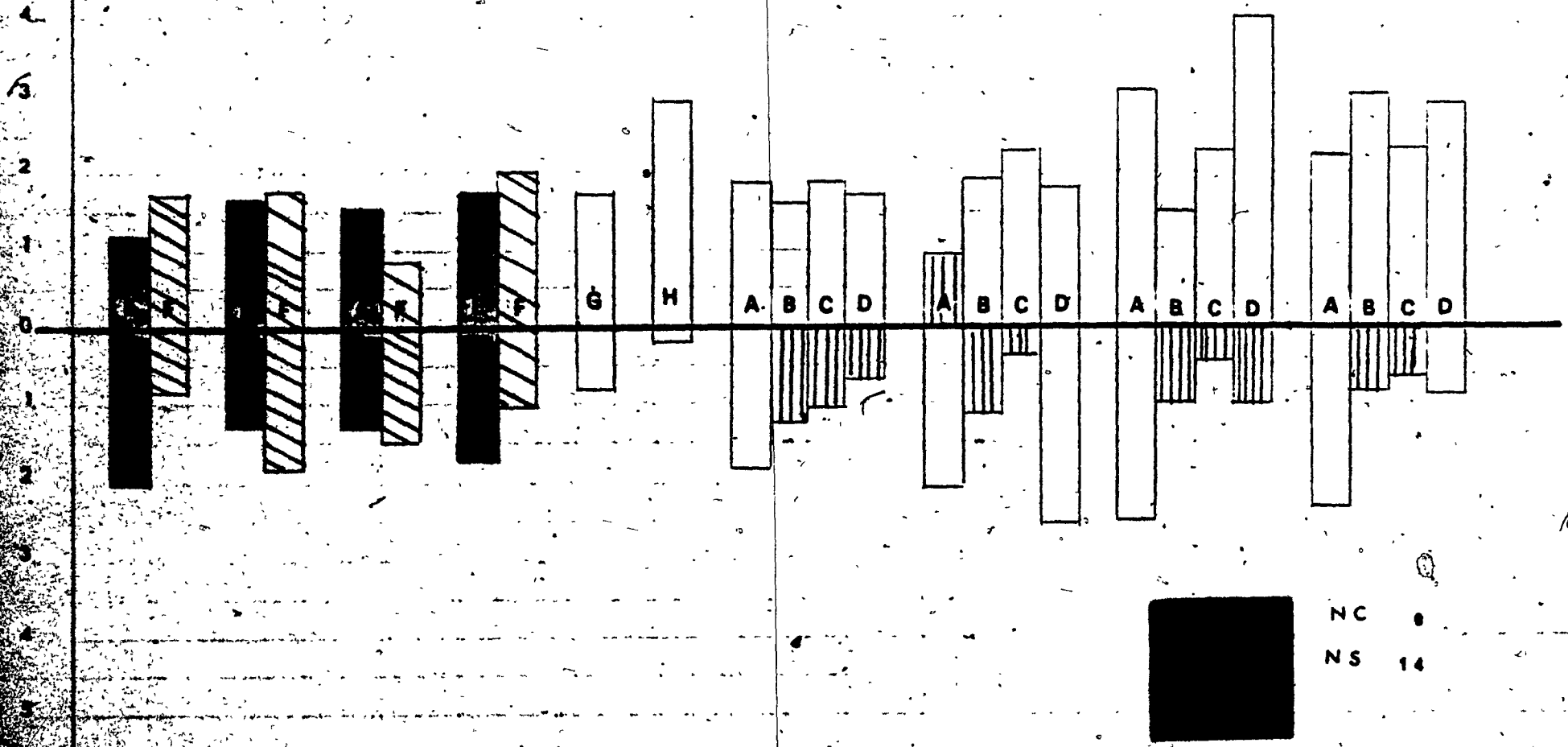

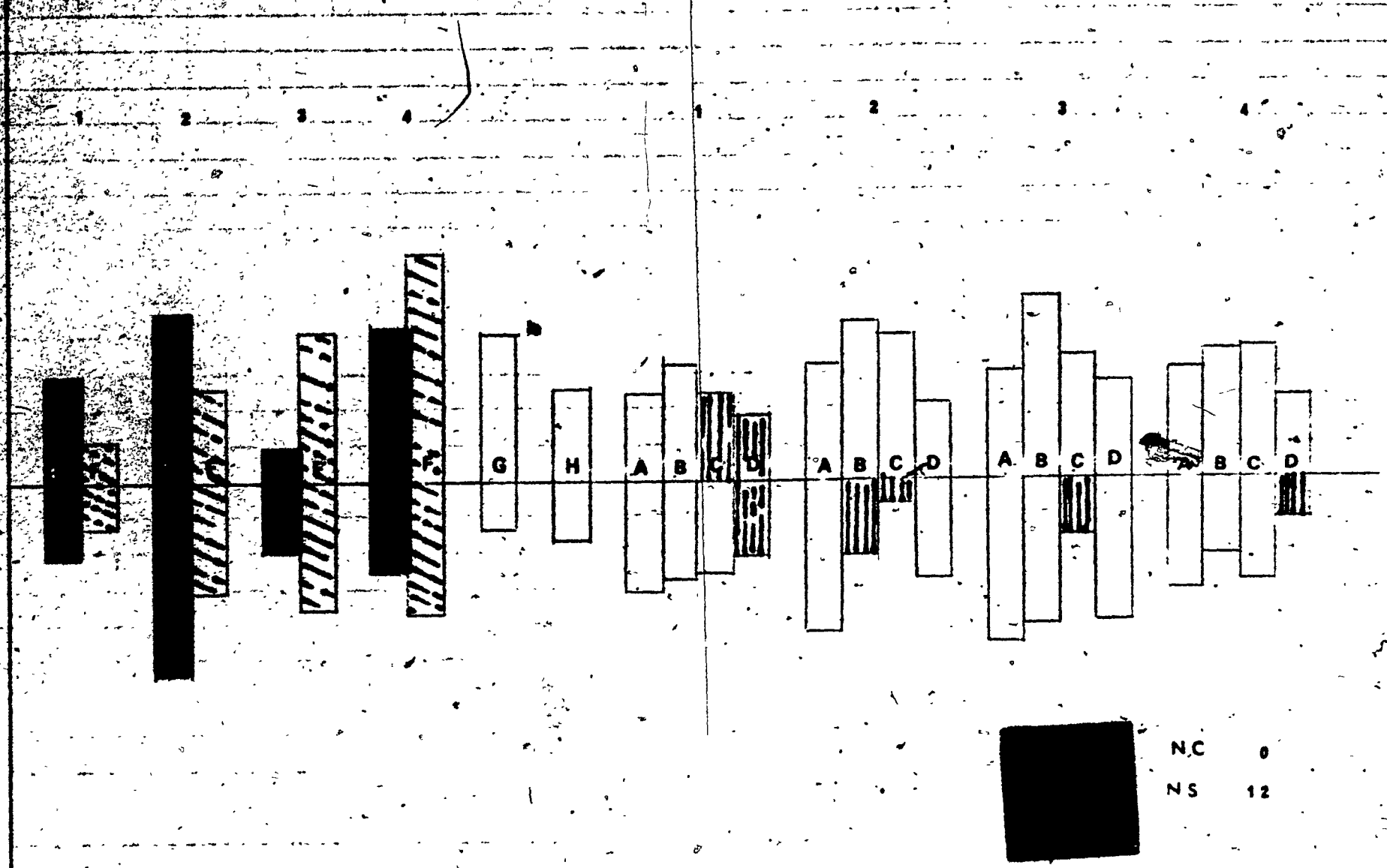
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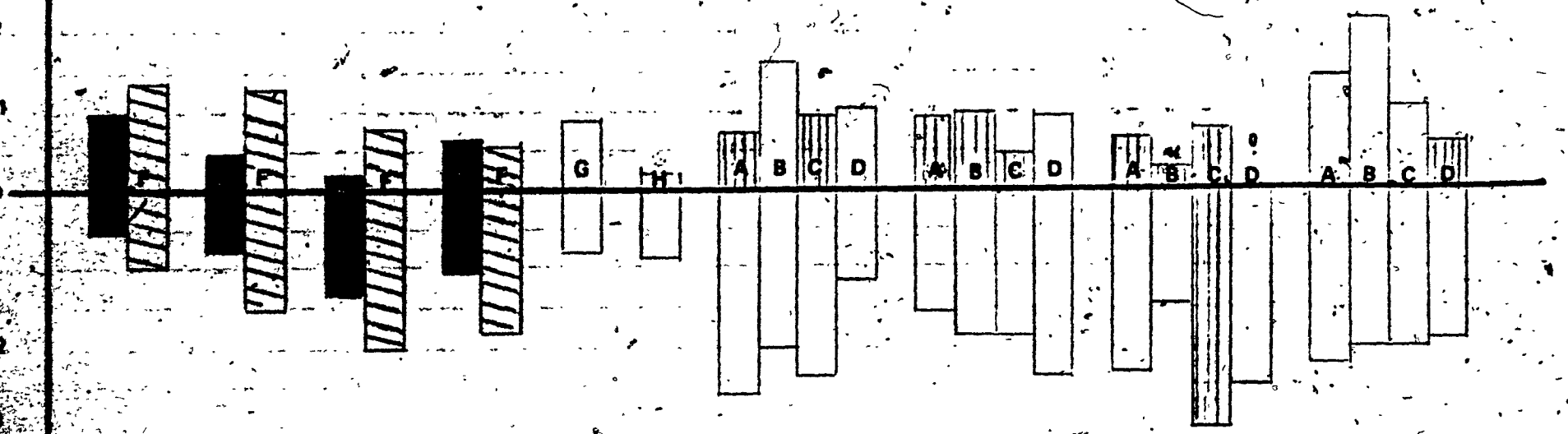

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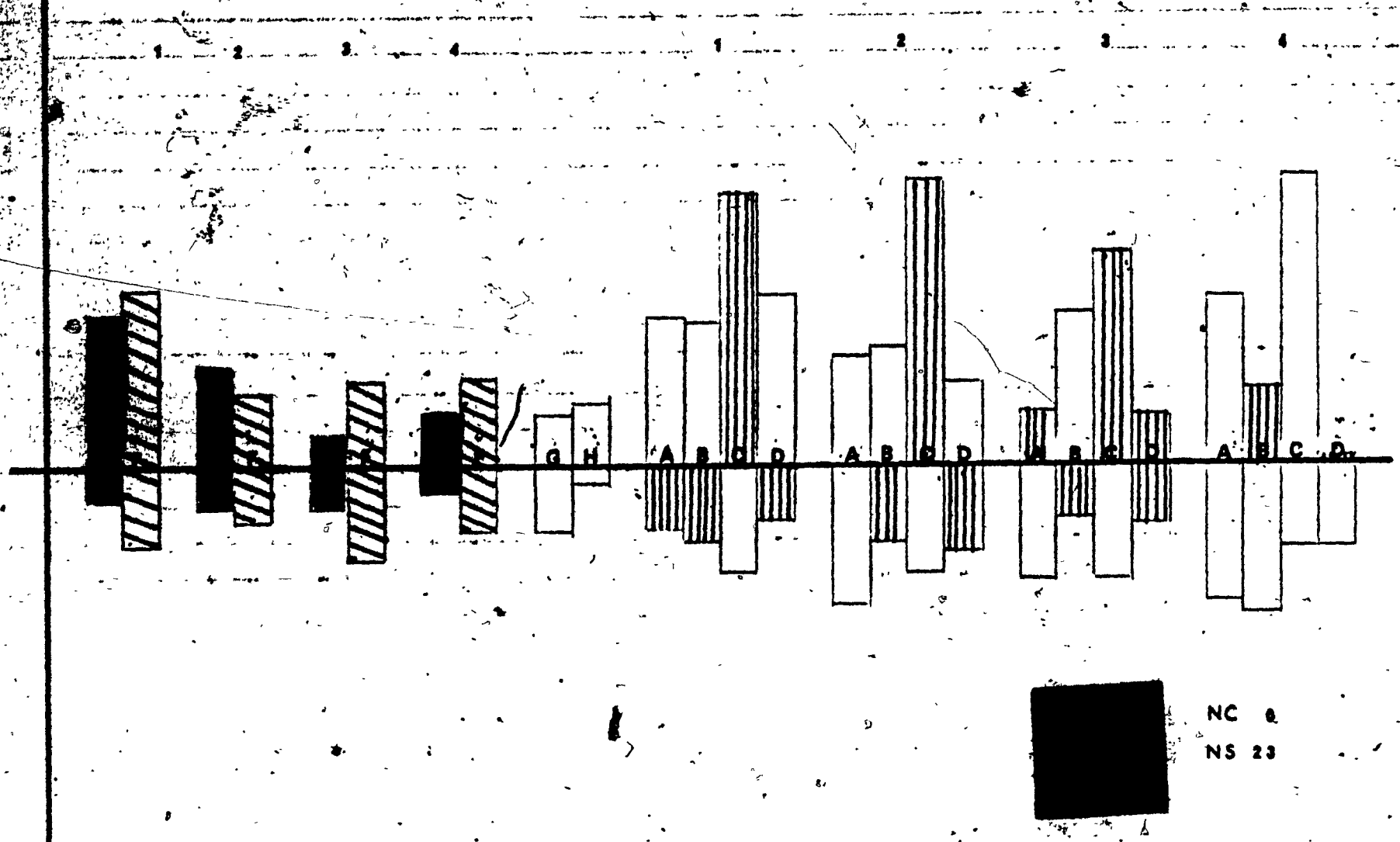
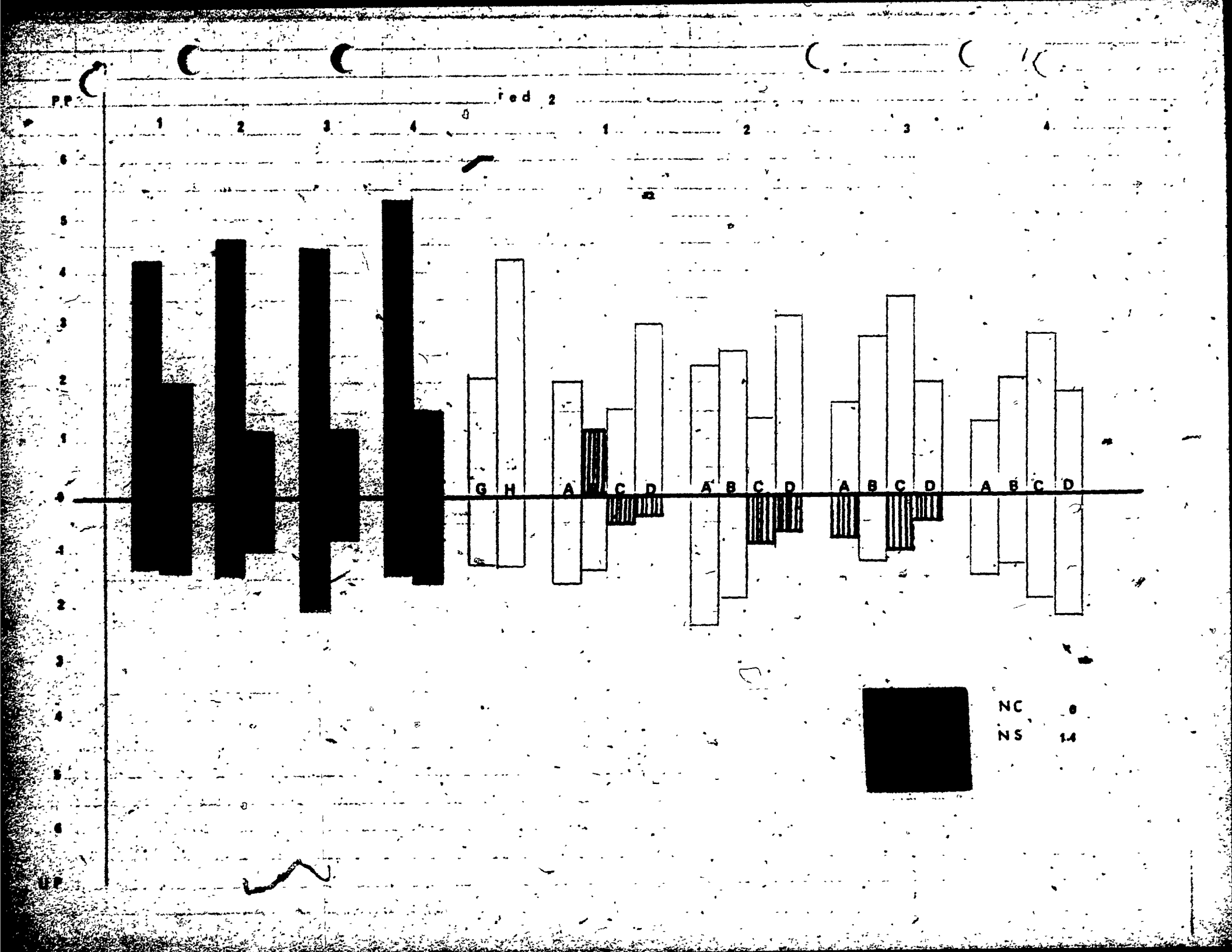
Fig 2

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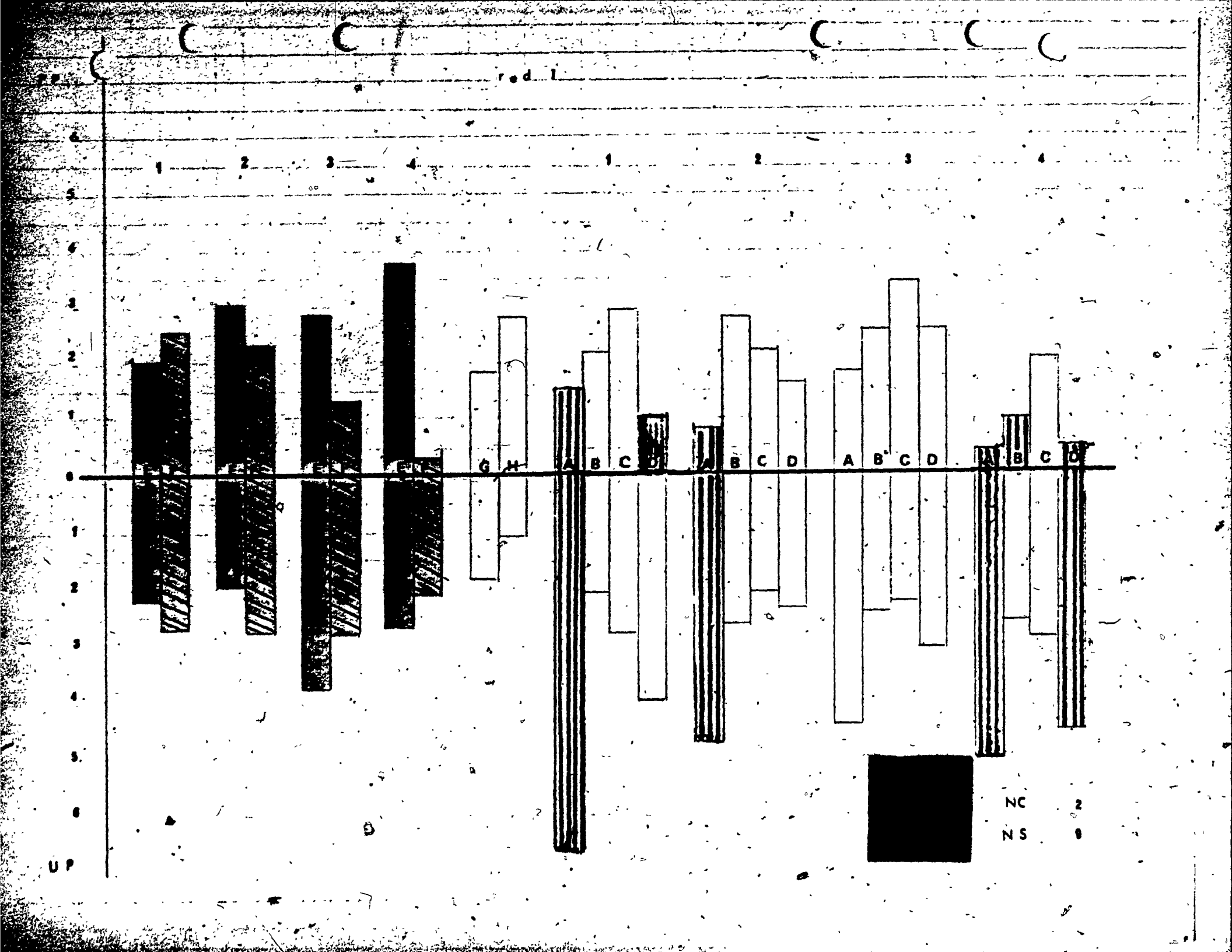
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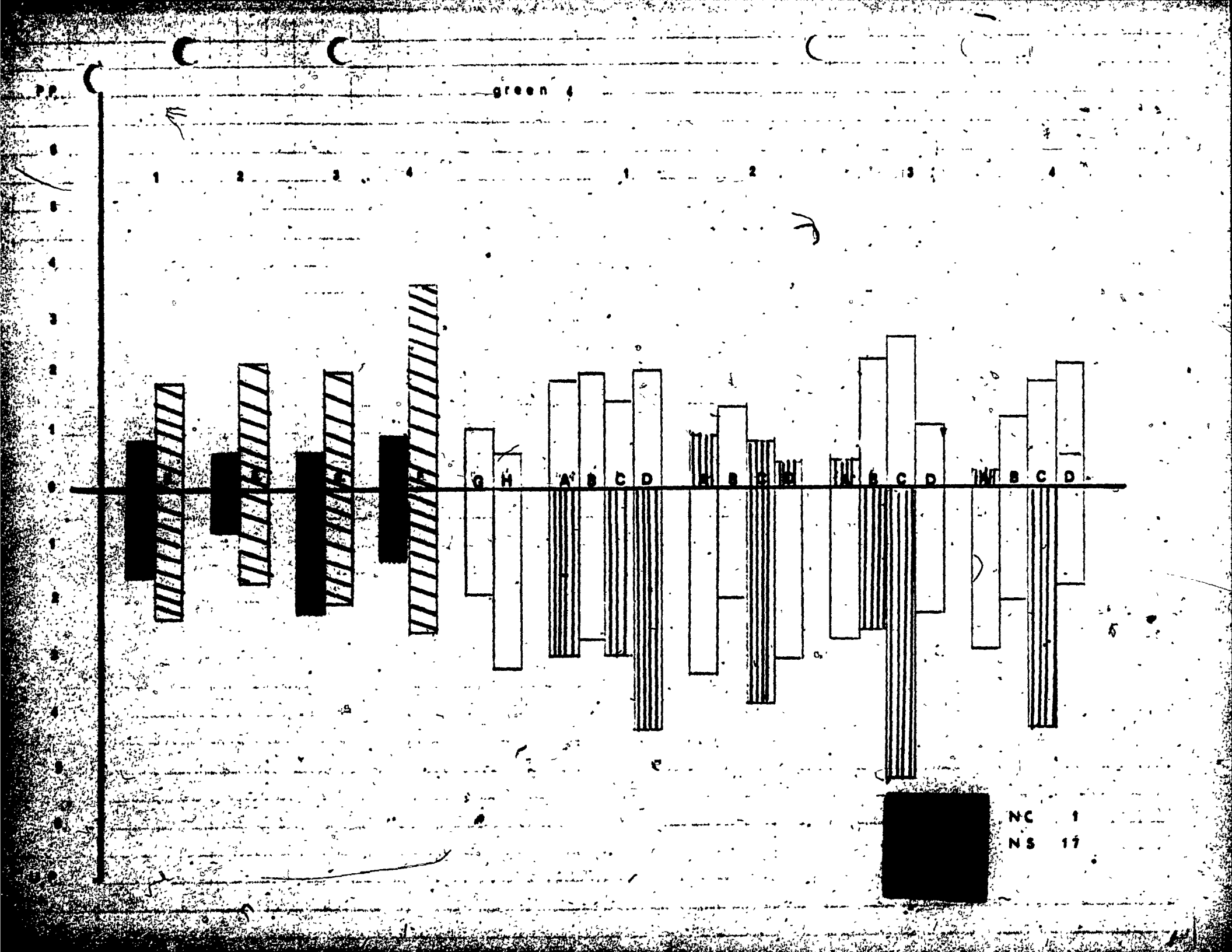
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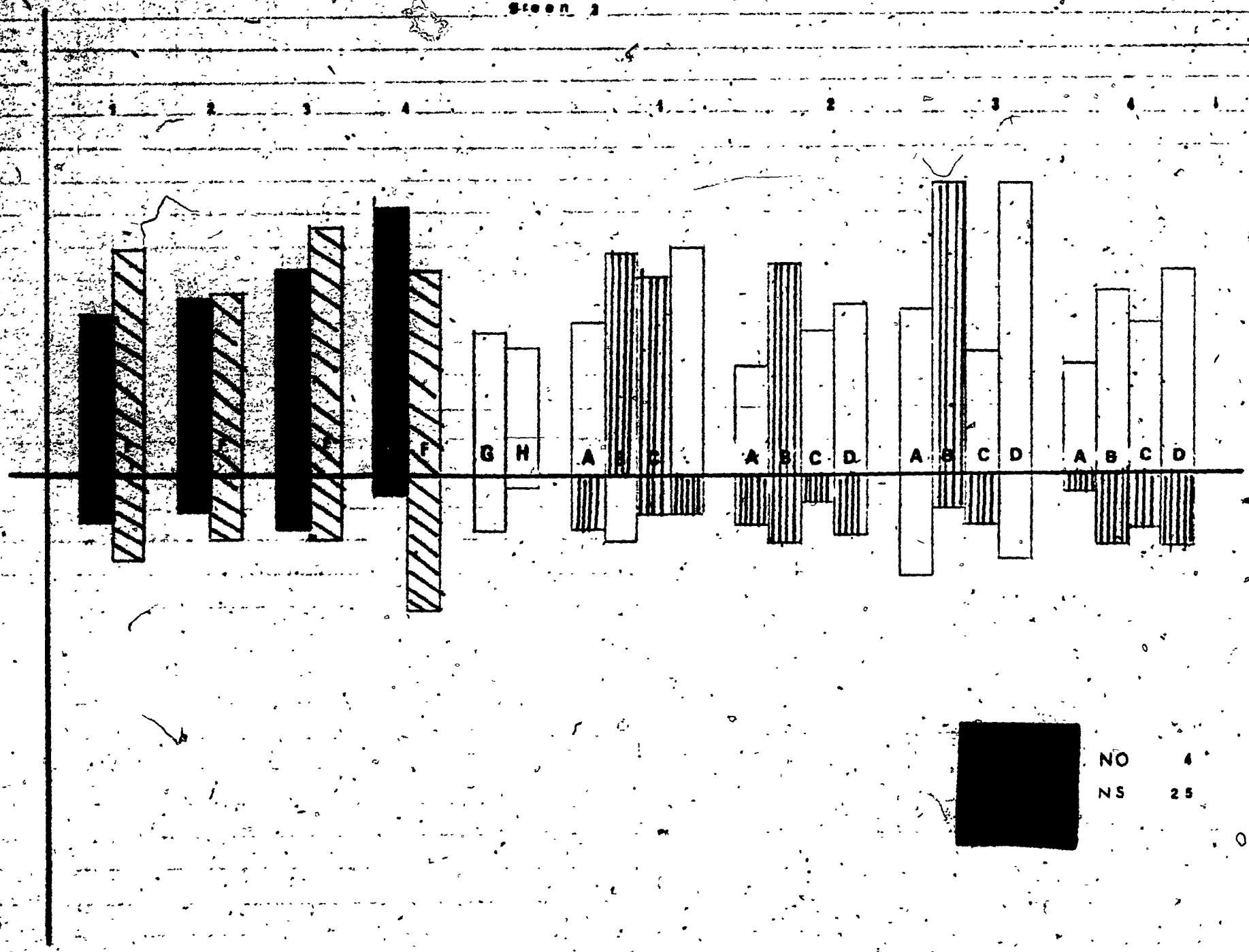
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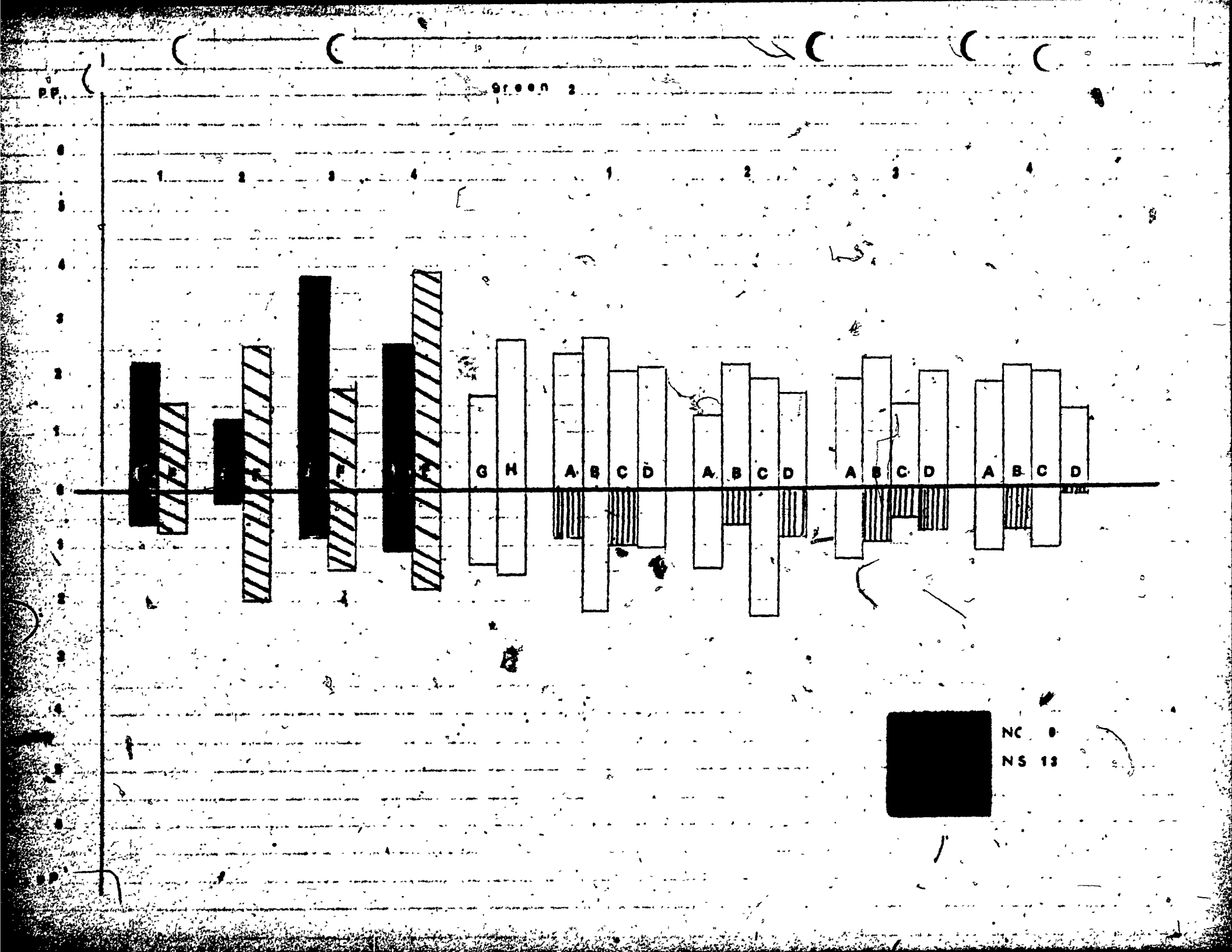
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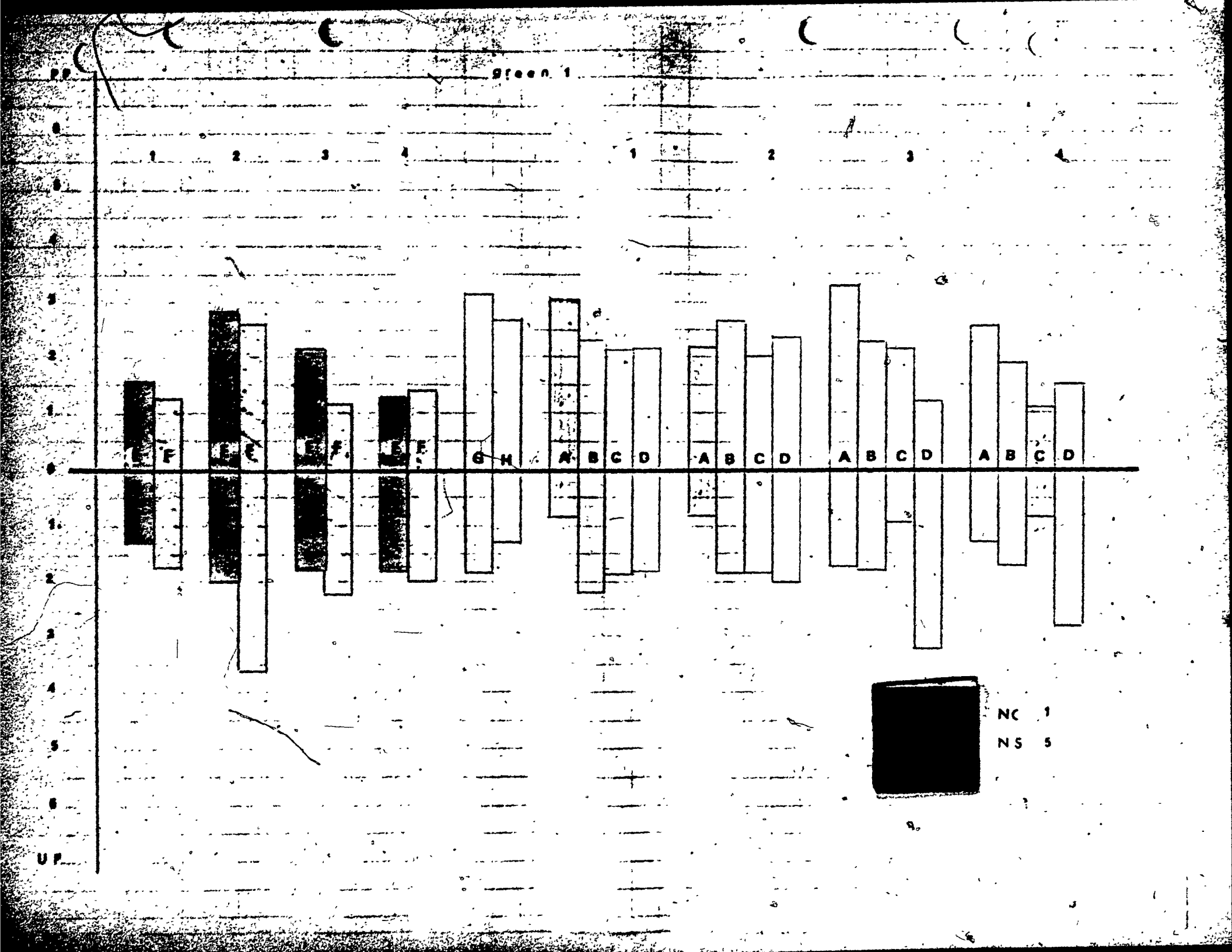
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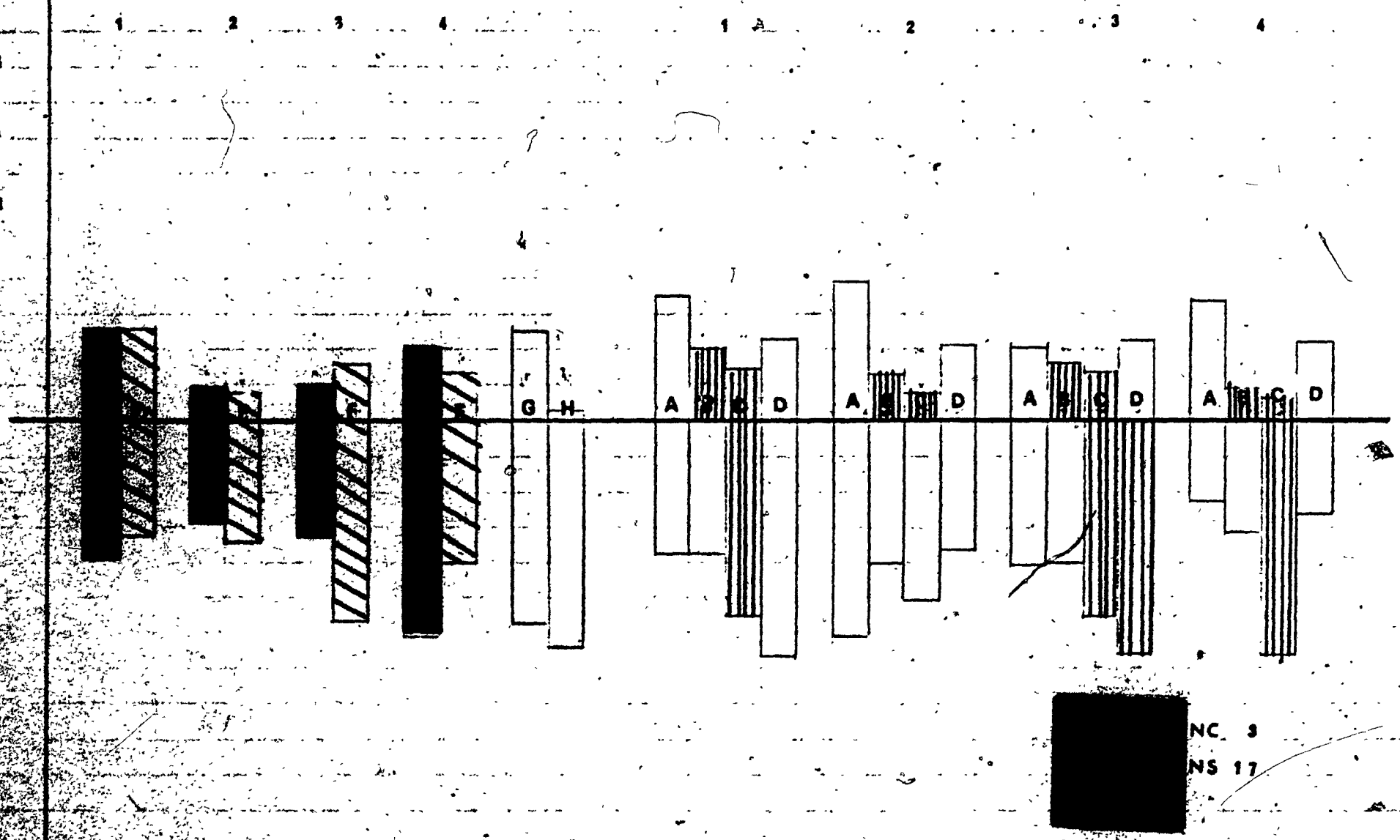

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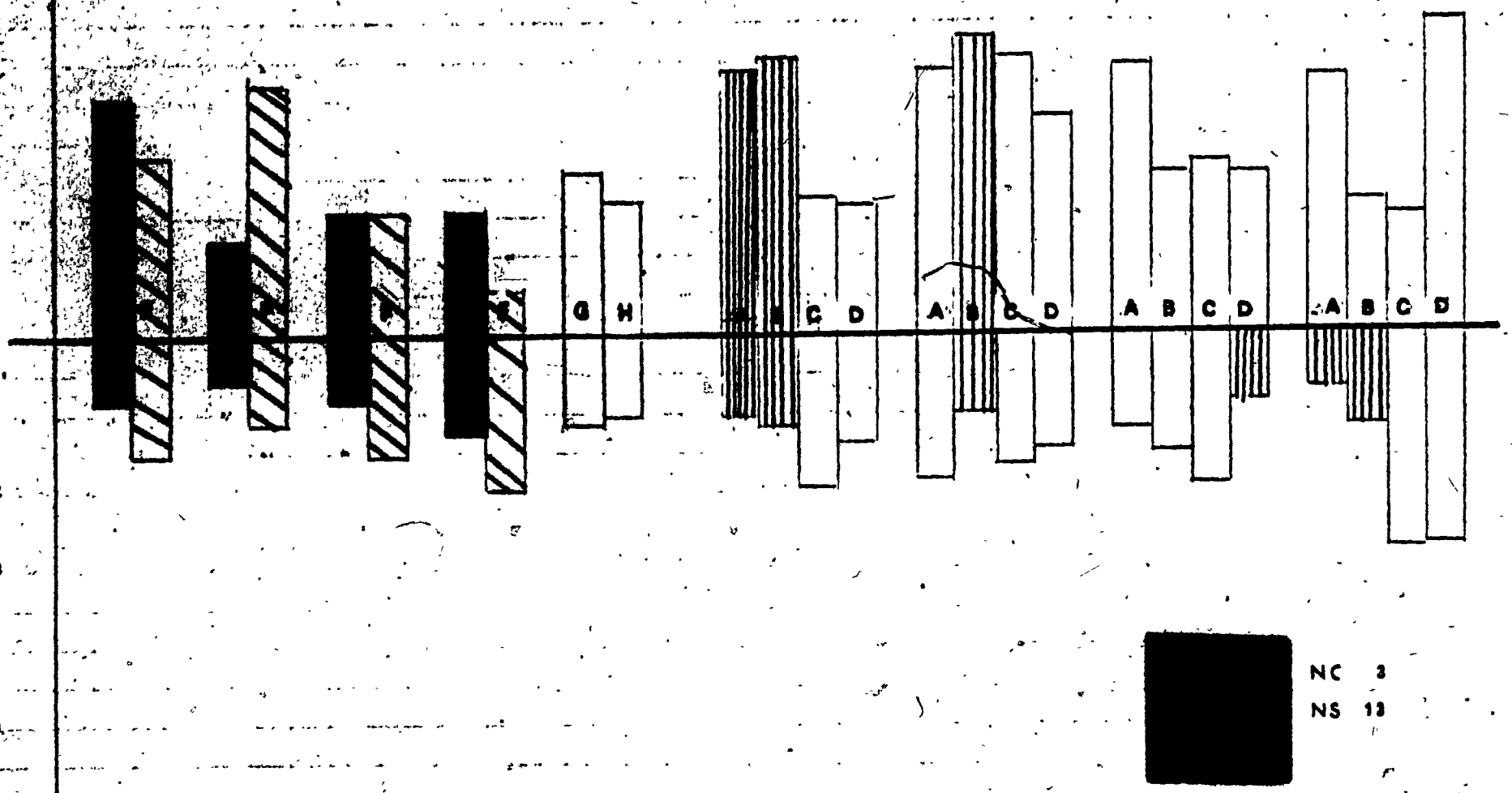

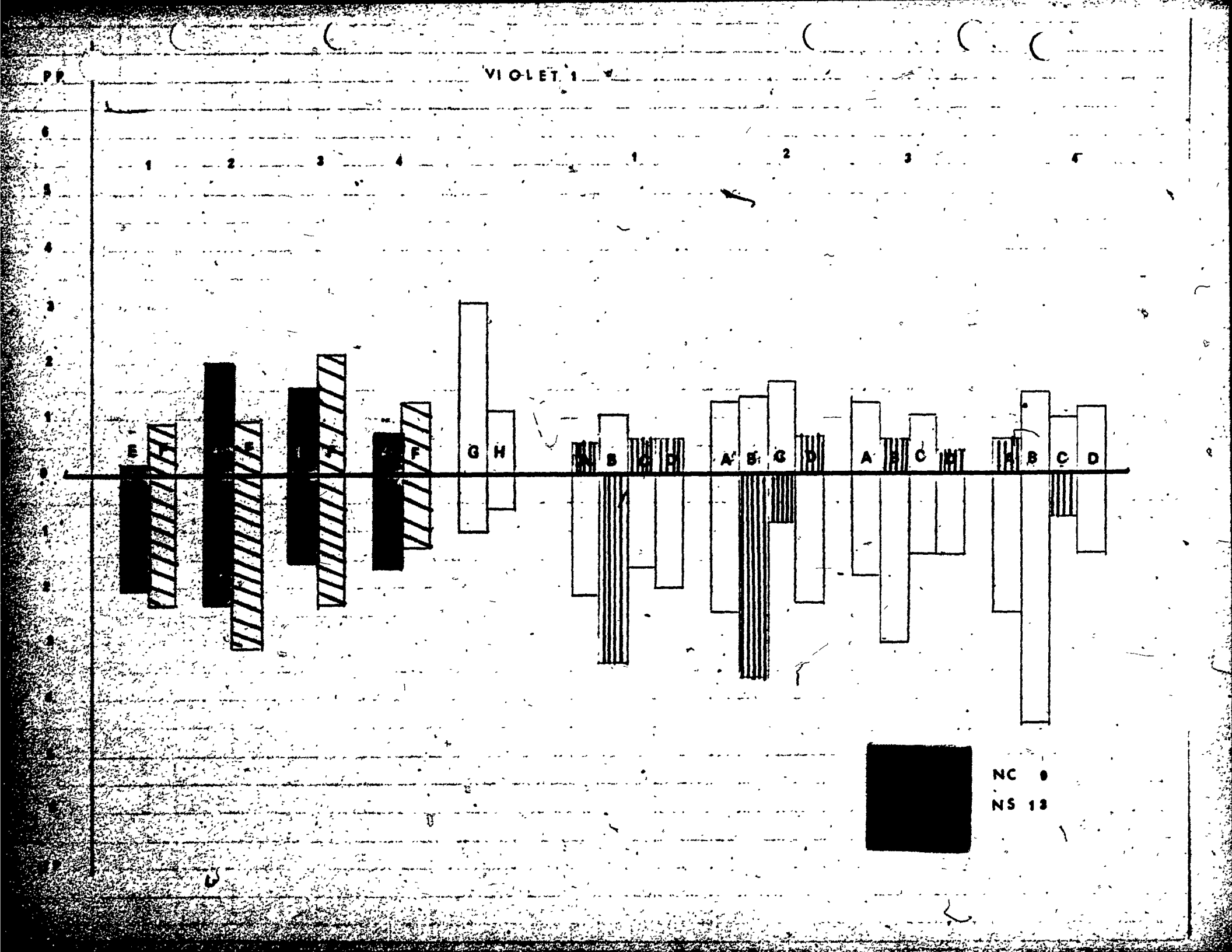
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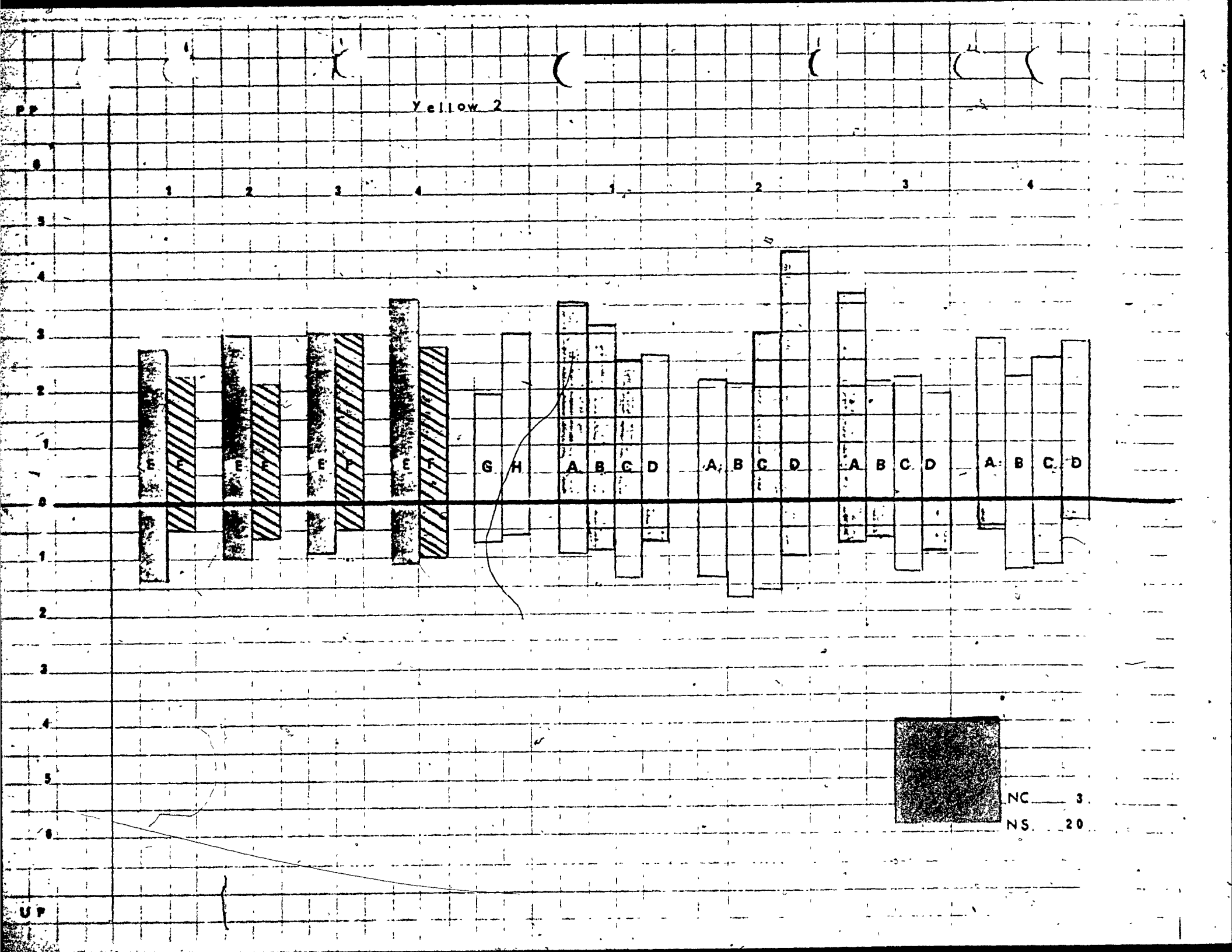
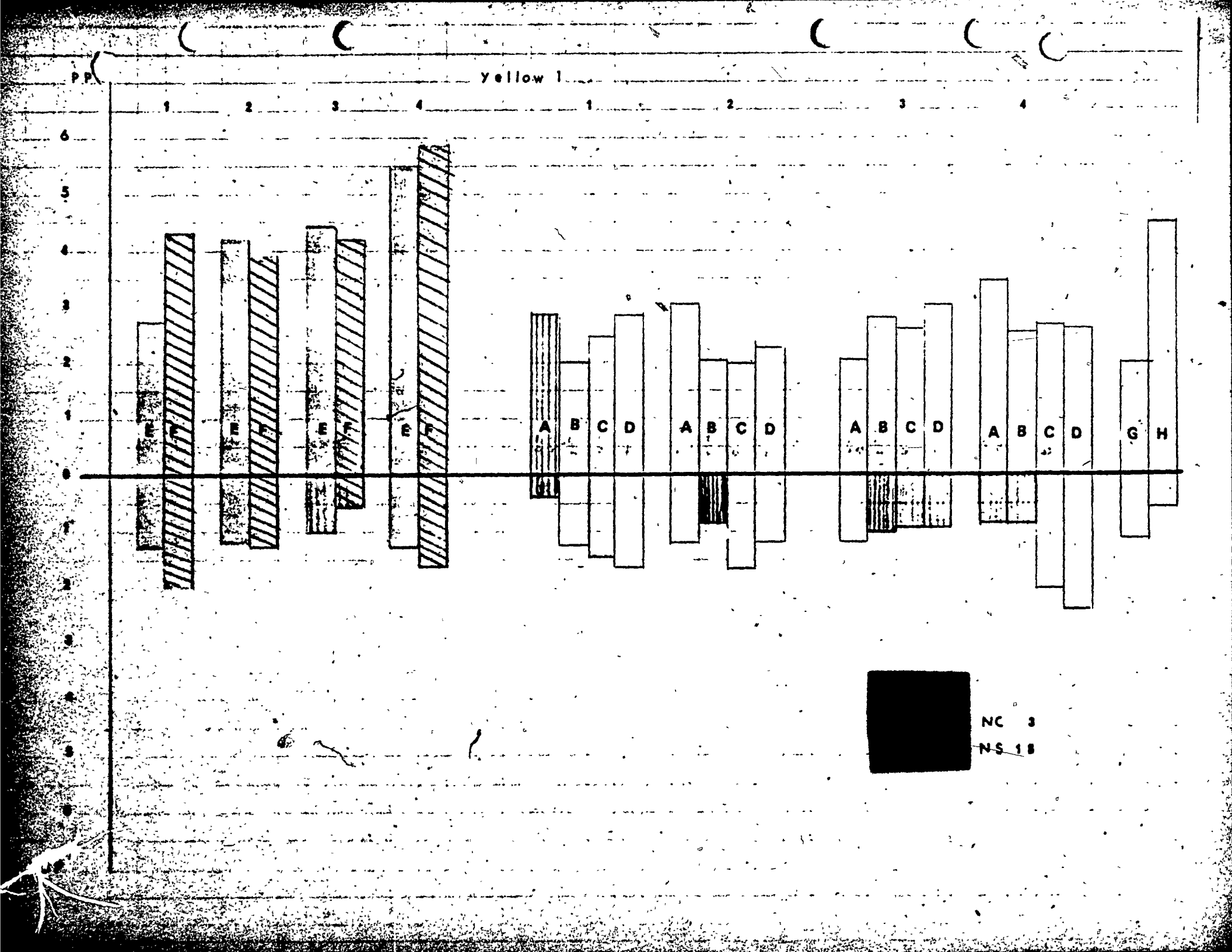
NS 13

Yellow 2

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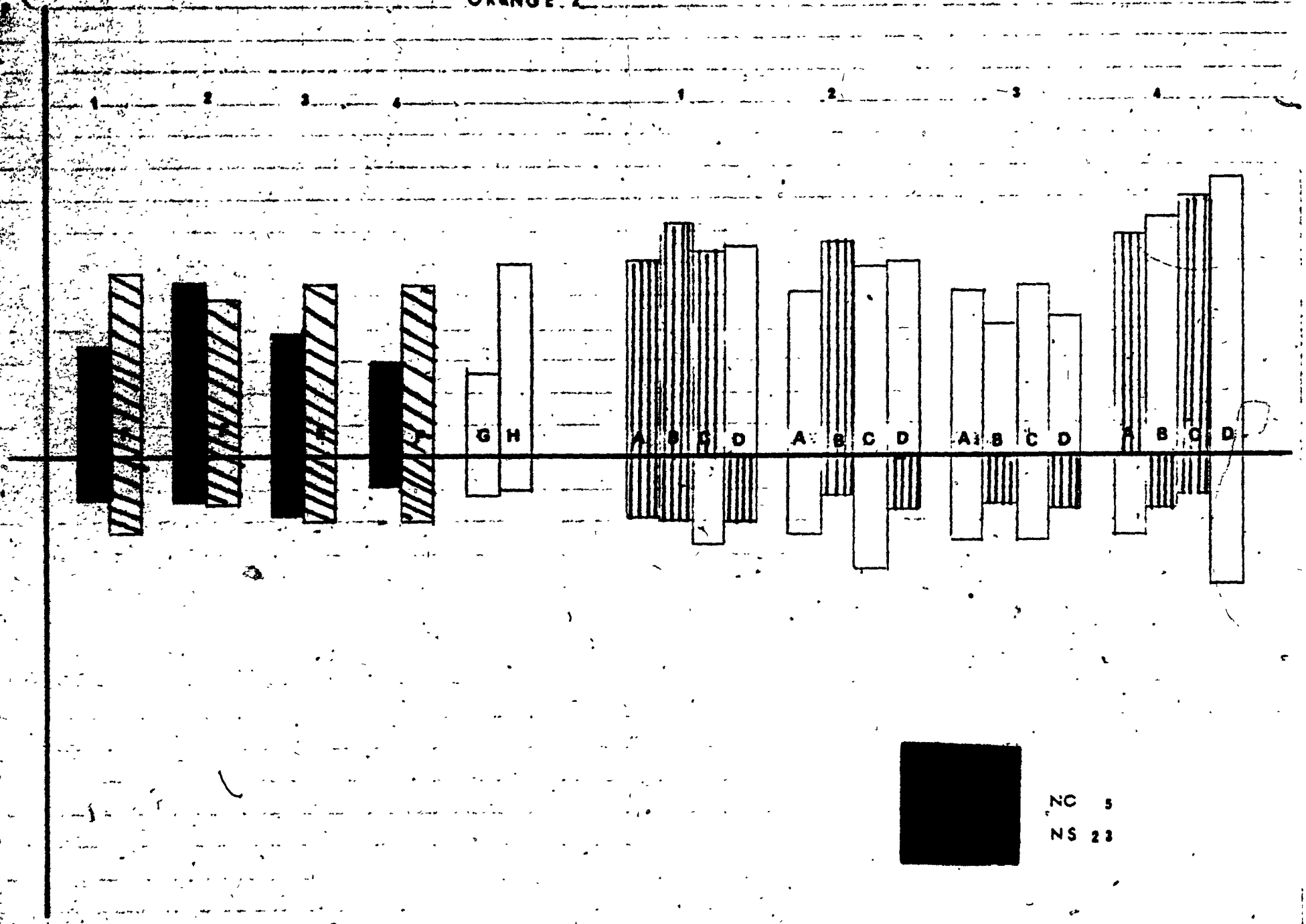
NS 18

ORANGE 2



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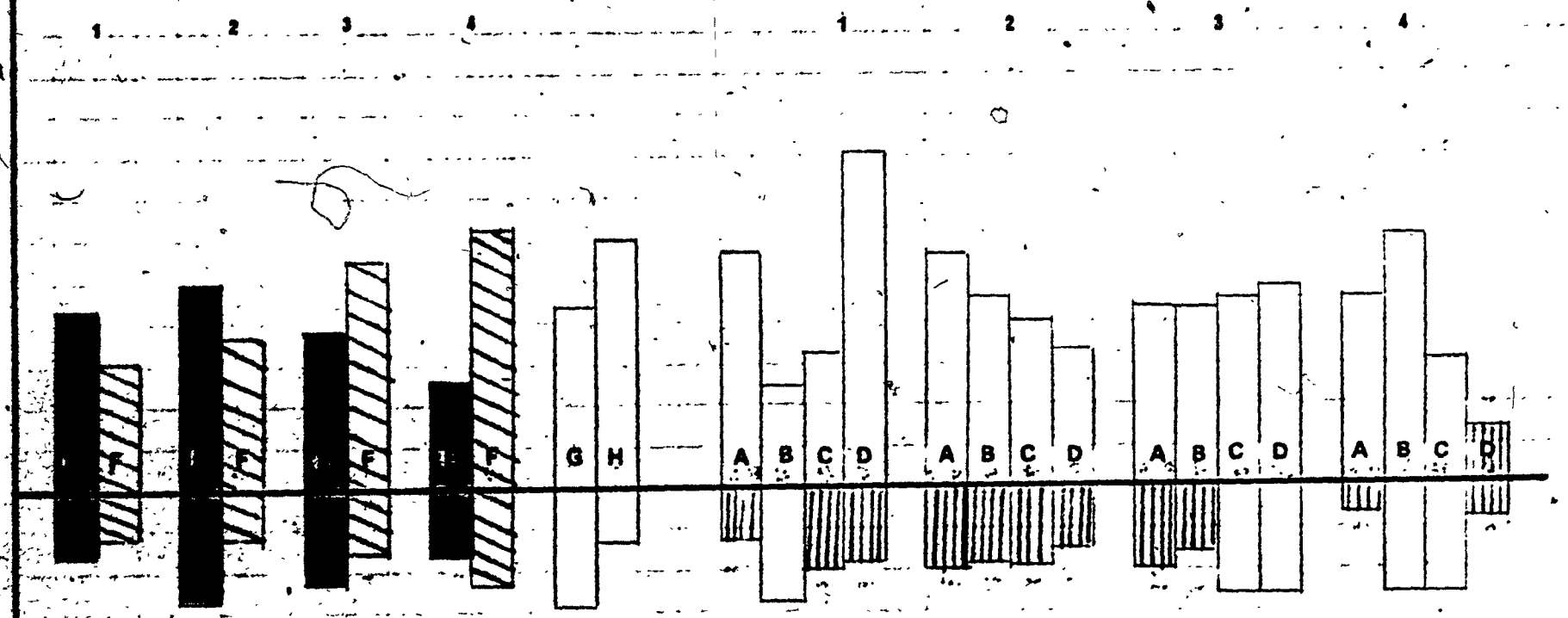
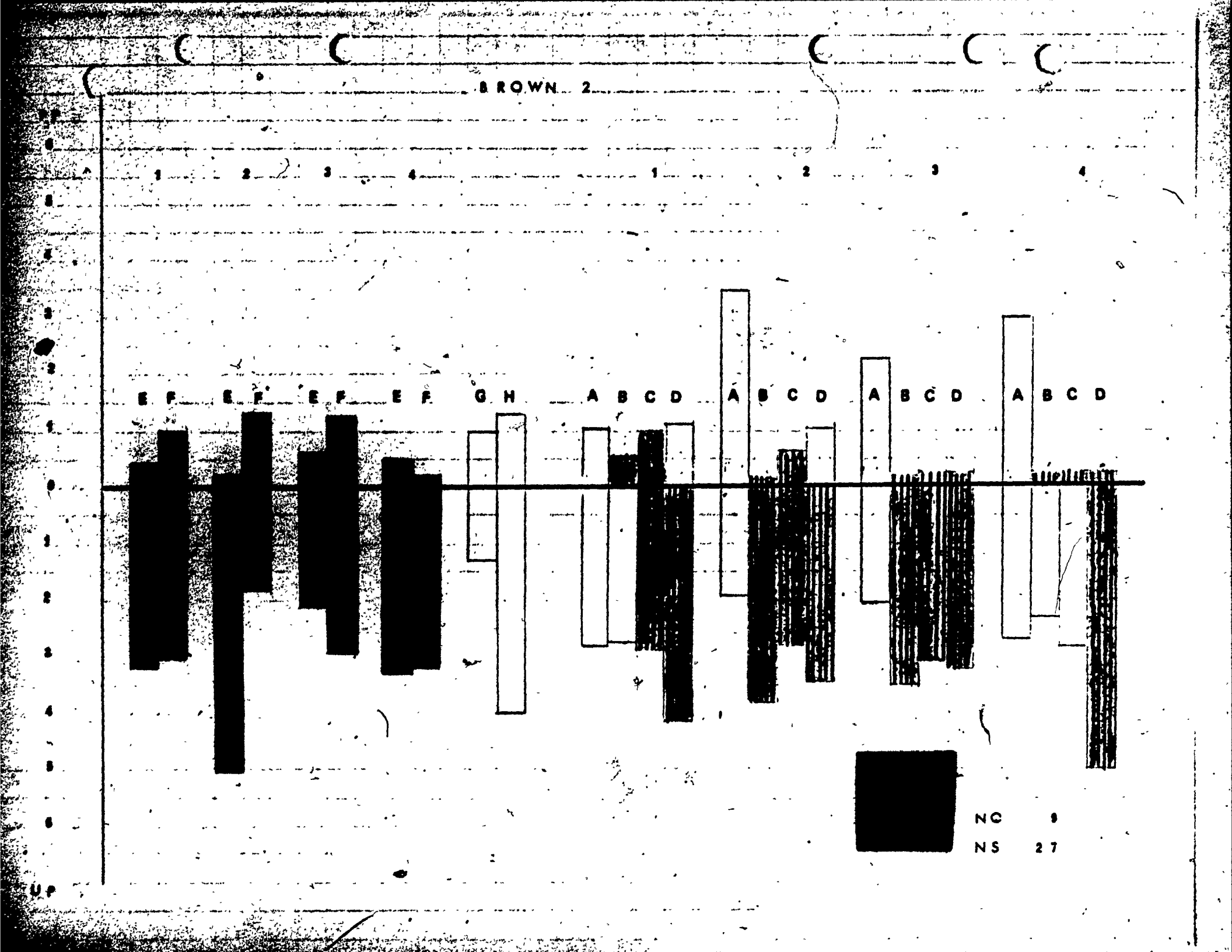


NC 8

NS 17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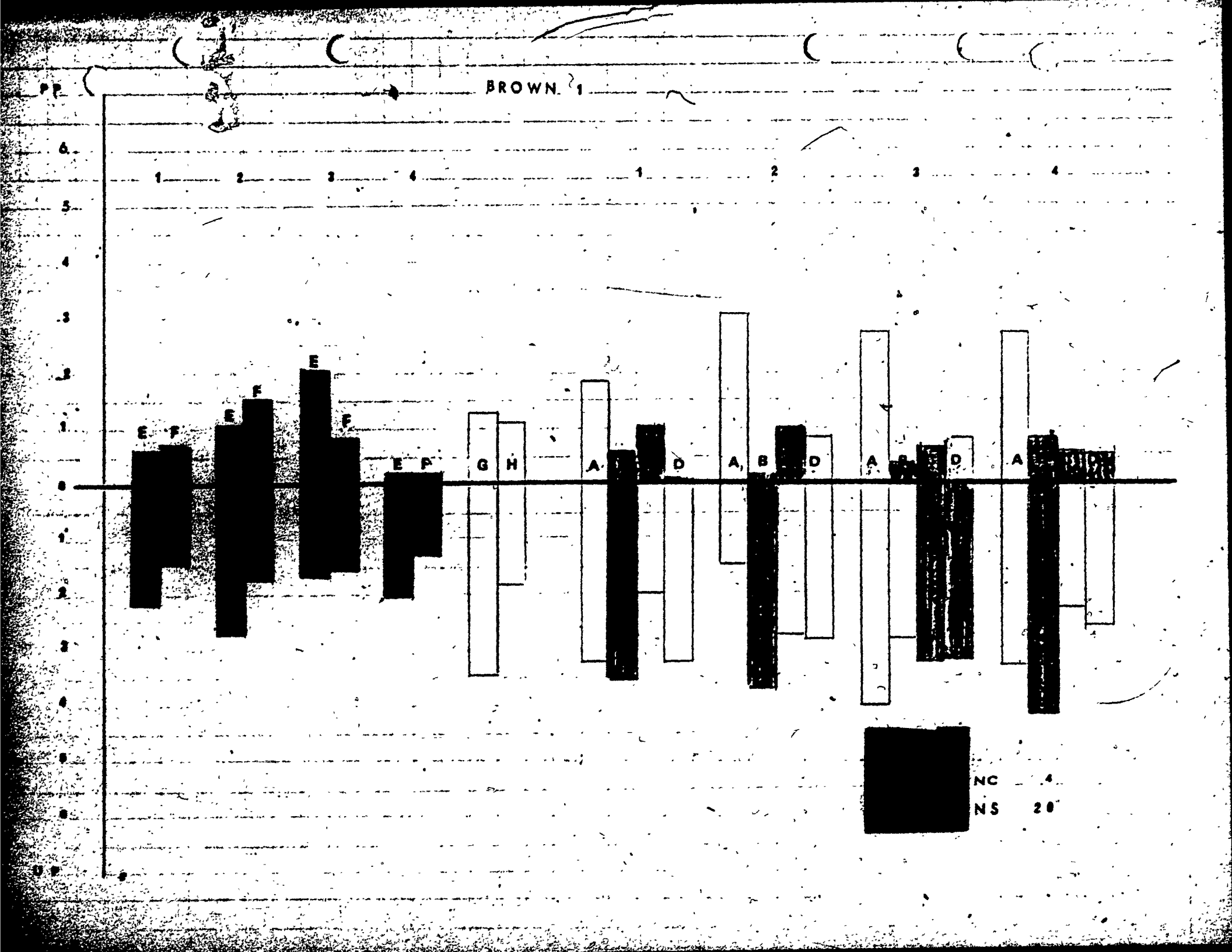
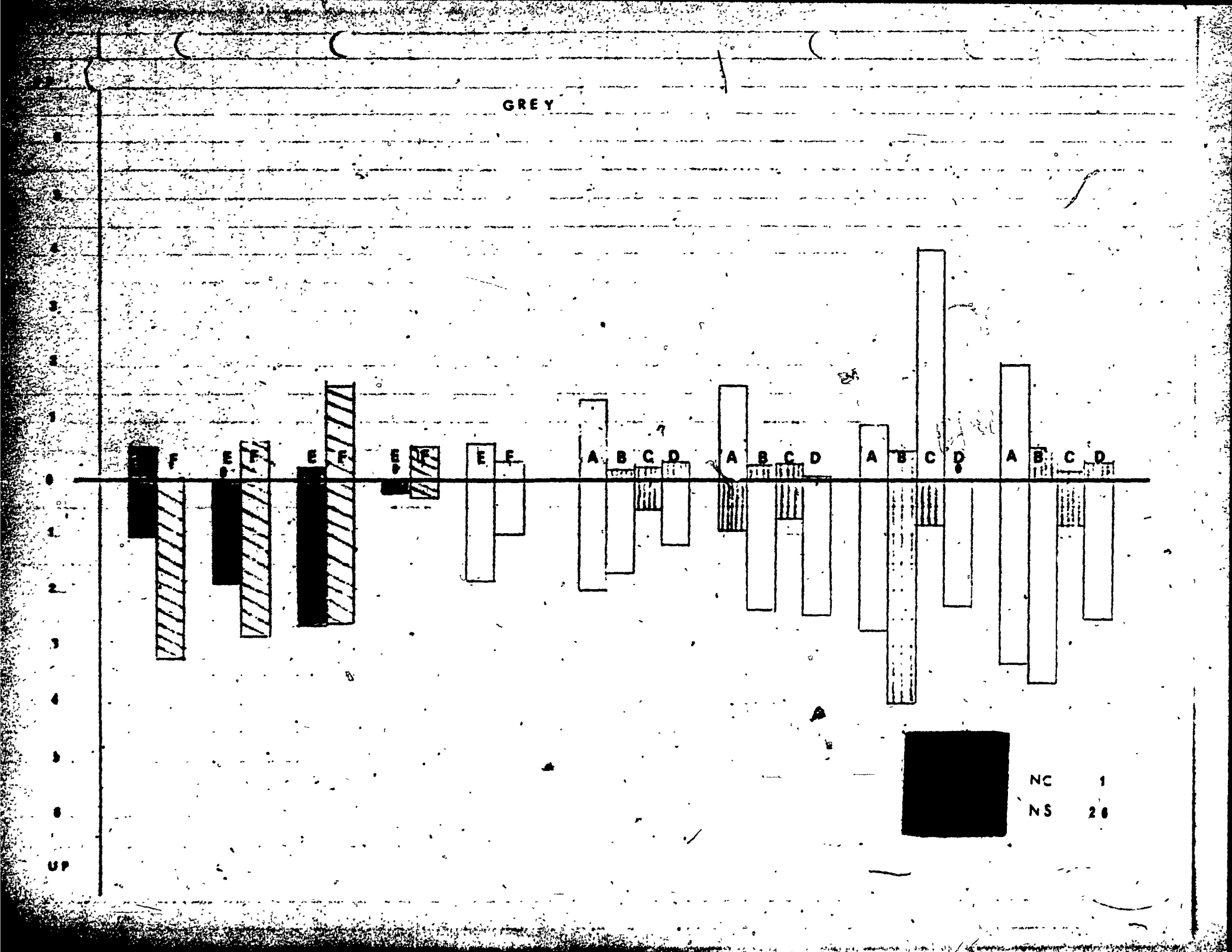
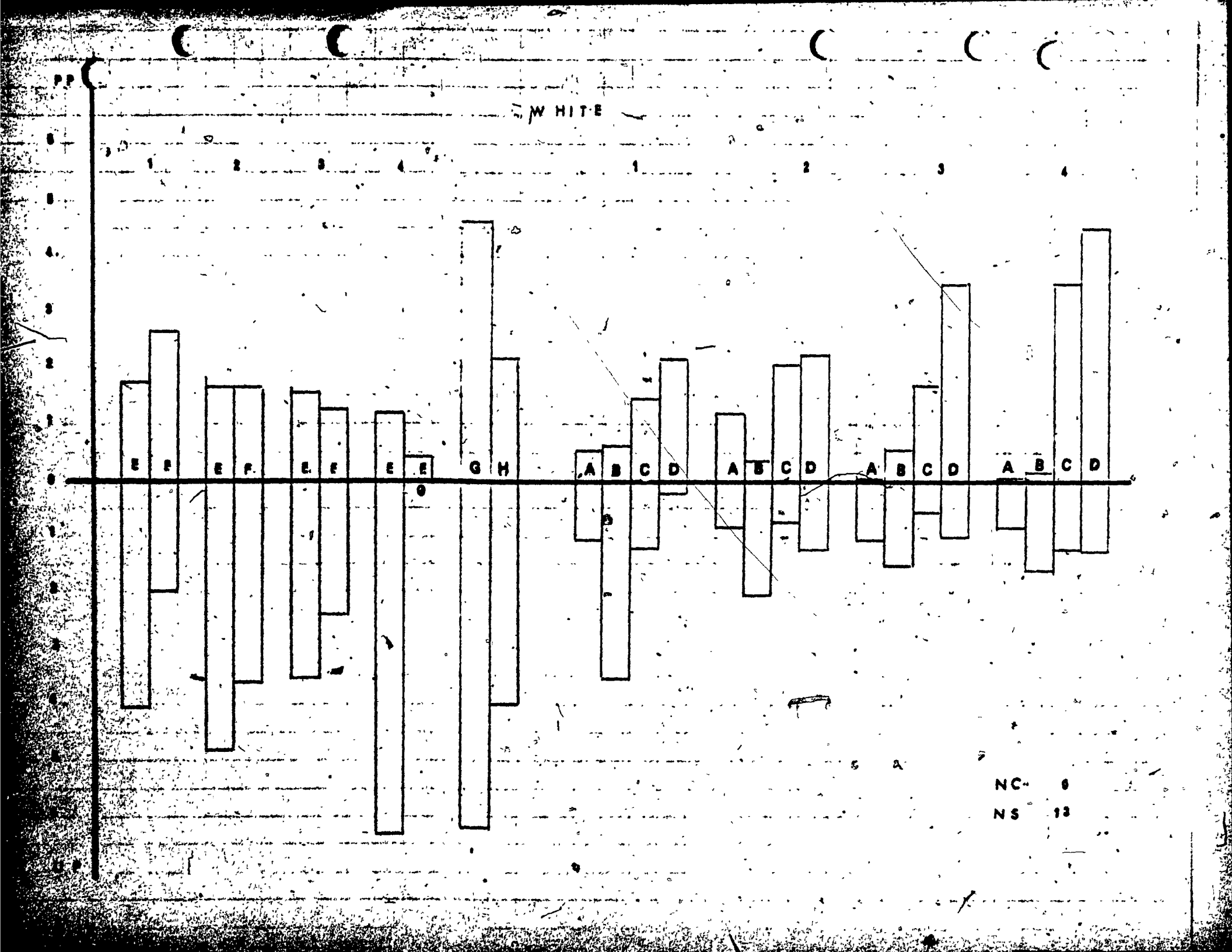
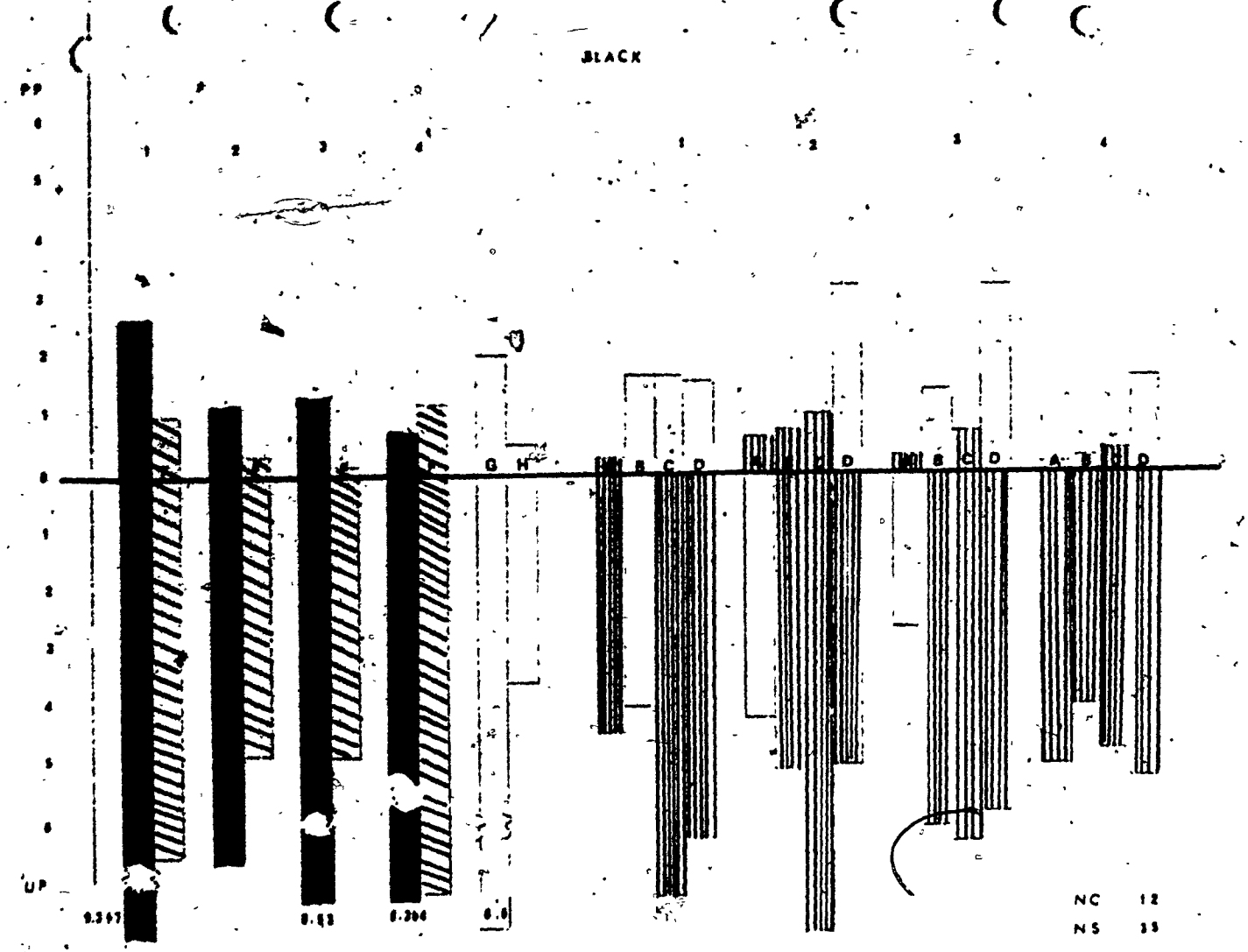
NC 9
NS 27
UP


BROWN 1
PP
6
5
4
3
2
1
0
1
2
3
4
1
2
3
4
E
F
E
F
E
F
E
F
G
H
A
D
A
B
D
A
D
A
NC 4
NS 28


GREY
UP
E F
E F
E F
E F
E F
A B C D
A B C D
A B C D
A B C D
NC 1
NS 28


WHITE
1 2 3 4 1 2 3 4
E F E F E F E E G H A B C D A B C D A B C D A B C D
NC- 0
NS 13


BLACK
PP
UP
NC 12
NS 33