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DOT SCREEN TEXTURE AND ITS EFFECT ON THE FIGURE-GROUND RELATIONSHIP

Borden D. Dent

The successful communication of geographical ideas through maps depends upon the clear visual organization of the map's elements. There are two visual organizations that the map designer must include on the map: first, the spatial arrangement of the physical or cultural distributions must be accurately portrayed and be obvious to the reader; second, the distributions must be set on a locational framework that can be seen easily and thus provide ease of locational orientation to the map user. It is especially important for the map designer to provide the locational framework as it is this graphic presentation that the map reader first visually assimilates. Only after the map reader visually organizes the locational framework will he attempt to gain the intellectual content of the map.

A method of providing the locational framework is to develop a figure-ground relationship on the map. The figure-ground relationship is a complex perceptual phenomenon in which an object in the visual field, called a figure, "stands out" or appears to lie above a surface imagined to pass beneath it. This lower surface is called the ground. In Figure 1, the black

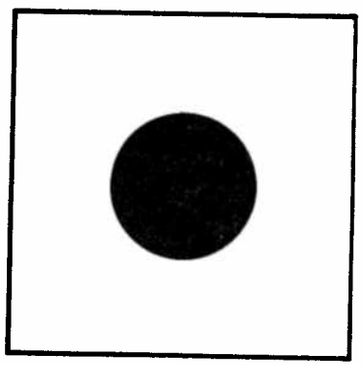


Figure 1

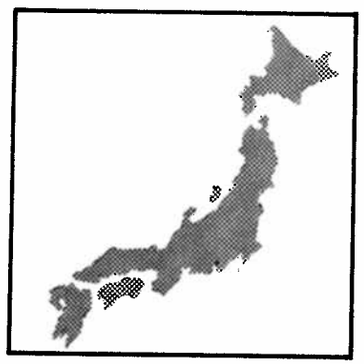


Figure 2

circle is nearly always seen as figure, and appears to stand above the white background. Figures have two characteristics that may be especially used by the map designer: first, when figures emerge from the ground they have visual prominence; second, they have shape. The cartographer can develop geographical areas on the map so that they appear to stand out from the background (the map plane). For example, land areas can appear to lie above surrounding water bodies. Figure 2 illustrates the islands of Japan as they appear to stand above a surrounding ocean. Similarly, geographical areas that are the center of interest of the map can appear to stand above surrounding land areas. Arkansas, in Figure 3, seems to be lying above the surrounding states. Geographical areas that have figure "character" offer the map reader a locational framework for his ease of visual orientation on the map.

Figure-ground relationships may be created with map elements in several ways. One is developing brightness contrasts between figure-objects and grounds. The brightness contrast evident in Figure 2 causes the islands of Japan to appear to lie above the map plane. Another technique is to create differences of internal complexity of structure between geographical areas on the map. Drafting the graticule over water areas and not over the continents is an example. Figure 4 illustrates this technique. The absence of structure provided by the graticule in the land area makes Australia appear to lie "over" the water. The shapes of continents

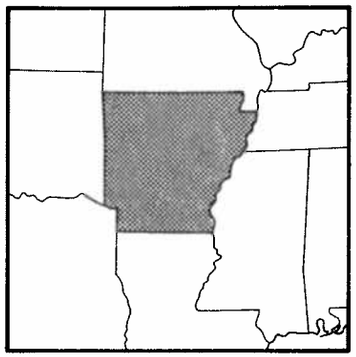


Figure 3

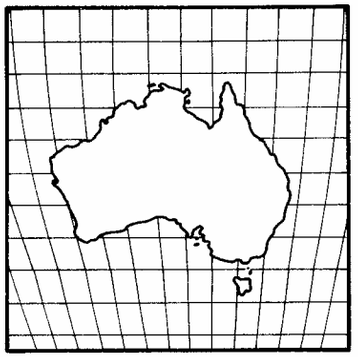


Figure 4

are more clear and they thus provide the reader with a good locational framework. One other technique is the application of dot or line patterns over geographical areas presented on the map to provide differences in texture. In recent years the dot pattern (screen) has been used more often than line patterns.

The effect of texture of dot patterns alone on the perception of the figure-ground relationship has not been fully investigated. Several questions may be asked concerning their use. When two adjacent dot patterns of different texture are used, is the map reader perceiving one as figure and the other ground? How much texture difference is needed to have one pattern appear to lie "over" the other? When the cartographer applies a dot pattern to a geographical area to have it "stand out", could he strengthen the relationship by choosing a dot pattern of different texture? A test was designed and given to eighty-eight Clark University students to find answers to these and similar questions.

The remainder of this paper considers in detail the procedures and results of this test.

Hypotheses of the Test

The following hypotheses were formulated prior to designing and administering the test: a) texture difference between two dot patterns does have some effect on the perception of the figure-ground relationship, b) the pattern with the fewer lines per inch of dots will appear as figure, and the pattern with relatively more lines of dots per inch will be seen as ground, and c) two patterns with a greater difference in the number of lines per inch of dots will be seen by the test subjects as having a stronger figure-ground relationship than two patterns with fewer number of lines per inch difference. A definition of texture as the number of rows of dots per inch was used in the test.

The Figure-Ground Test

A series of dot patterns manufactured by Artype were chosen for the test. The per cent area inked (value) for each pattern was 40% and the arrangement of dots in each pattern was square. The textures of the patterns were as follows:

Pattern Number	Lines per Inch
4003	27.5
4008	30.0
4013	32.5
4018	42.5
4023	55.0
4028	60.0

The dot sizes of the patterns were not the same. When maintaining the per cent area inked as constant, and varying the texture, the dot sizes are affected. As the lines per inch increase, the dot size decreases. It is not known if differences in dot size of screens will affect the perception of the figure-ground relationship.

Castner has shown in a previous study (1) that as texture becomes as high as eighty-five lines per inch, observers no longer perceive individual dots in a screen, but only a gray tone. Therefore, since the perception of texture was important in this study, the number of lines per inch of dots were kept well below eighty-five.

The test included twelve test squares, each with two dot patterns separated by an irregular contour. Figure 5 shows four of the twelve test squares used in the test. Six test

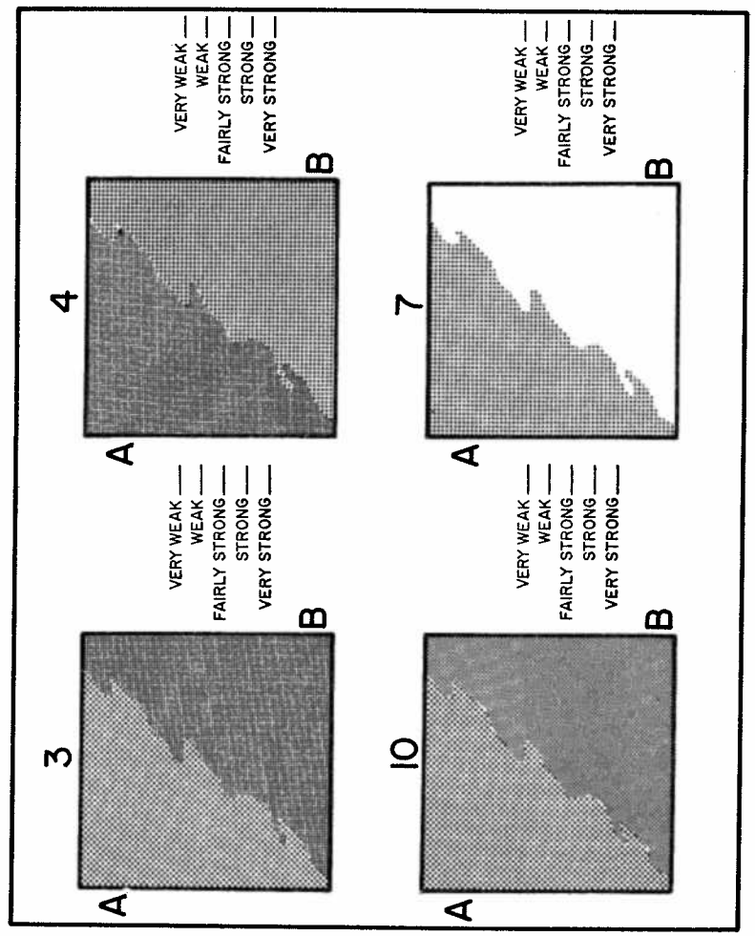


Figure 5

squares had the axes of the dot lines for both patterns oriented horizontally-vertically within the test square. Two test squares had one pattern oriented 90 degrees with respect to the edges of the square, and the other pattern oriented 45 degrees to the edge. These two squares were adopted for the test to determine if differences in orientation of adjacent dot patterns has any effect on figure-ground perception. The test also included two test squares with both their patterns oriented 45 degrees. Similarly, these were included to test the effect of their orientation. Finally, there were two test squares with only one pattern in each. These were used to determine if the screened area or the white area is perceived as figure.

By varying the combination of patterns chosen for this test, texture differences in the test squares ranged from 2.5 lines per inch to 55.0 lines per inch. Table 1 lists all the test squares and the texture differences between their patterns. The subjects were instructed to record which pattern they perceived as figure by circling the letters A or B. In the event neither pattern appeared as figure to the subject he was told to circle neither A nor B.

Next to each test square was a ranking in which the subjects were to indicate their evaluation of the strength of the figure-ground relationship by checking one of the following: very strong, strong, fairly strong, weak, and very weak. These were later recorded and correlated with texture differences in the test squares to determine if there is any positive association between what the subjects perceived as strong figure-ground relationships and texture difference in lines per inch.

The test was presented in a booklet containing an instruction sheet, two sheets of printed test squares, and an information sheet at the end. In addition to data concerning the subject's personal and academic background, information was also obtained to determine if the subjects were biased. Thus the data gathered allowed the investigator to record whether the subjects were associating the patterns as land and water, and if they felt they had consistently associated the patterns with any particular geographic area. For instance, it was suspected that since many of the students used for testing were from the New England area, they might have consistently chosen the left pattern as figure throughout the test squares because they were associating the left pattern as a land area.

The test was administered to eighty-eight undergraduate and graduate students at Clark University. Twenty students listed their college major as geography, sixty-three were non-geography majors, and the five remaining were undecided or undeclared majors (mostly freshmen). Within the group of non-geographers, eighteen subjects were psychology majors, and the rest were divided more or less equally into sociology, history, government or art majors. Sixty-one per cent of the subjects tested claimed one of the New England states as their home residence. Twenty-nine per cent of the students were from New York, Maryland, New Jersey, Pennsylvania, and West Virginia. The remaining ten per cent came from Tennessee, Ohio, Minnesota, Washington, California, England, and the Virgin Islands.

Test Results

The first task in the analysis of the test results was to record the frequency of responses for each test square. These frequencies were placed in either coarse, fine, or neither cells. The fine pattern was chosen more often than the coarse pattern in only test square #1 (2.5 lines per inch difference). In test square #10 (15.0 lines per inch difference) the coarse and fine patterns were chosen equally often. For the remaining test squares the coarse pattern was chosen as figure considerably more than the fine pattern.

These results show that as the lines per inch difference between patterns increase so do the frequencies of choosing the coarse pattern as figure. Figure 6 shows these results graphically. The remaining analyses examined what effect bias had on the results, and tested the statistical significance of these frequencies.

Checking for Possible Subject Bias

Because of the design of each test square, with the irregular contour separating the patterns, it was felt that the subjects might have been equating this consciously or subconsciously as a coastline separating a land mass and a water body. To test for possible bias the following procedures were used:

(1) Those subjects who answered that they had associated the pattern as a land-water difference were placed in one group; those who had not were placed in a second group.

(2) The frequencies of response were tabulated for each of these two new groups. In this case the frequencies were cast into 2 categories: left and right (plus neither).

(3) H_o: There is no difference between the two groups in the proportion of subjects who chose the left pattern or the right (plus neither) pattern.
H_1: A greater proportion of those subjects who saw a land water difference (yes group) would choose the left pattern more often than the no group.

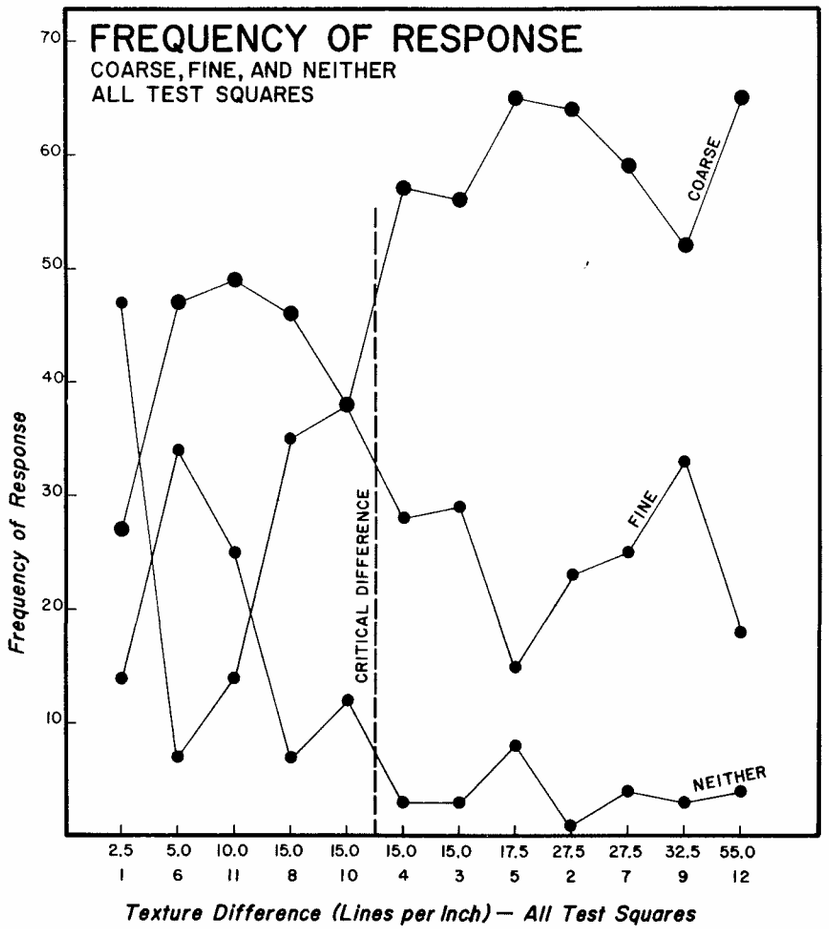


Figure 6

(4) The frequencies of response were cast into a 2x2 contingency table. There was a contingency table for each test square. Rows: Yes, No; Columns: Left and Right (plus neither).

(5) Statistical Test: The X^2 test for two independent samples, with df = 1.

(6) N = 88 for each contingency table. Significance level: $\alpha = .05$.

(7) Rejection Region: At $\alpha = .05$, df = 1, $X^2 \geq 3.84$.

(8) Results: The H_o was accepted for each test square. That is, there is no significant difference between the two groups in the proportion of subjects who chose the left pattern or the right (plus neither pattern).

It may be reasonably concluded, therefore, that although some test subjects saw a land-water difference this did not bias the test results.

The test subjects who saw a land-water difference were asked if they had associated the difference with any particular geographic area. Of the 59 who said they saw this difference, 17 recorded they had associated it with the northeastern coast of the United States, 8 with

other areas throughout the world, and 34 with no particular geographic area. Since the 17 who linked the patterns with the northeastern United States formed a large group, the decision was made to see if their responses had biased the results in any way. The test subjects who associated the patterns with the northeast United States might have consistently chosen the left pattern (land) as figure. The following procedures were employed to test for possible bias here:

(1) The subjects who answered that they associated the test patterns with the northeastern United States were placed into one group; those who associated the land-water difference with no particular area were placed into a second group.

(2) The responses were tabulated for each of these two new groups. As in the first test for bias, the frequencies were cast into 2 categories: left and right (plus neither).

(3) H_o: There is no difference between the two groups in the proportion of subjects who chose the left pattern or the right (plus neither) pattern.

H_1: A greater proportion of those subjects who associated the patterns as a land-water difference with respect to the northeastern United States would choose the left-hand pattern more often than those test subjects who associated the difference with no particular area.

(4) The frequencies of response were cast into a 2x2 contingency table for each test square. Rows: associated patterns with the northeastern United States; associated patterns with no particular geographic area. Columns: left and right (plus neither).

(5) Statistical test: the X^2 test for two independent samples, with df = 1.

(6) N = 51 for each contingency table. Significance level: $\alpha = .05$.

(7) Rejection region: At $\alpha = .05$, df = 1, $X^2 \geq 3.84$.

(8) Results: The H_o was accepted for each test square. There was no significant difference between the two groups.

It may be concluded that although some subjects associated the test squares as a land-water difference with particular reference to the northeastern United States, this did not bias the over-all test results.

One further check was made to see if the subjects were biased in any way. Geographers have more experience with map reading than other academic groups. It was felt that perhaps the geographers might have been perceiving the test square patterns differently than the others tested.

A test similar to the bias tests above was conducted. Conclusion: At $\alpha = .05$, there was no significant difference between geographers (here defined as people having six or more geography credits) and non-geographers in the proportion of subjects who chose the coarse pattern or the fine (plus neither) pattern for all test squares - with the exception of test square #1. Geographers tended to choose the coarse pattern significantly less than did the non-geographers. It is unclear why this should be so.

Testing the Significance of the Observed Frequencies

Major bias did not enter into the test results. Therefore, the next major analysis was to test the significance of the over-all responses. A test was employed here to determine if the frequency of responses in each category (two categories: coarse and fine plus neither) were simply due to chance alone or whether they were statistically significant departures from some expected frequency.

The statistical test was the one-sample test. The H_o became: the coarse pattern will be chosen equally often as the fine (plus neither) pattern, or, there is no difference in the expected frequency between the two categories. The expected frequency for each cell, then, was 44 (N=88). Under this H_o, one would expect the coarse pattern to be chosen 44 times and the fine (plus neither) responses to equal 44 in each test square. This would indicate that there is nothing especially different between the two adjacent patterns. If the observed value of X^2 for each test square is accepted under this H_o, then the differences from the expected frequency is due to chance only. However, if the X^2 values are rejected, then there is some factor, other than chance, operating. The other factor in this test was texture differences.

For the test, $\alpha = .05$, df = 1, N=88, and rejection region: $X^2 \geq 3.84$. The test was applied to each test square. The table of X^2 values obtained were:

TABLE I

Test Square	Text. Diff.	X^2	Accept/Reject, $\alpha = .05$
1	2.5	13.136	reject
6	5.0	.408	accept
11	10.0	1.136	accept
8	15.0	.180	accept
10	15.0	1.636	accept
4	15.0	7.68	reject
3	15.0	6.544	reject
5	17.5	20.044	reject
2	27.5	18.18	reject
7	27.5	10.226	reject
9	32.5	2.908	accept
12	55.0	20.044	reject

Test squares 6, 11, 9, 8, and 10 were accepted under the H_o. Test squares 1, 4, 2, 3, 5, 7, and 12 were rejected. The observed frequencies in the test squares rejected, therefore, deviated significantly (not due to chance alone) from the expected frequency under the H_o.

Analysis of Results of the Observed Frequency Test

Departures from the expected frequencies of 44-44 in the X^2 one-sample test become more apparent as the number of lines per inch separating the two patterns increases. A critical value or threshold may be placed at approximately 15 lines per inch (notice in the table above that the X^2 values increase considerably somewhere between test squares #10 and #4). After as many as 15 lines per inch separating the two patterns is reached, the frequency of choice of the coarse and fine (plus neither) patterns is no longer due to chance alone.

There were four combinations of patterns that had 15 lines per inch texture difference:

8 - (accepted), coarse vertical, fine 45 degrees
#10 - (accepted), both 45 degrees, coarse pattern on the right

4 - (rejected), both 90 degrees, coarse right, fine left
3 - (rejected), coarse 45 degrees, fine vertical

In test squares #8 and #3, both patterns were identical, but each was reversed in orientation. Reversing the patterns caused a change in the result. A better distinction between figure-ground is obtained when the coarse pattern (figure) is oriented 45 degrees to the vertical, and the fine pattern (ground) at 90 degrees to the vertical.

The observed frequencies in test square #10 were not significant. There is only one other test square for direct comparison. Test square #5 (rejected) had both patterns oriented 45 degrees to the vertical, with the coarse pattern on the right side. Test square #5 had 17.5 lines per inch separating the two patterns, where test square #10 had only 15.0. That test square #10 was accepted and #5 was rejected may be due to the two texture differences, or in the placement of the coarse pattern (right vs. left in the test square). When two patterns are both 45 degrees to the vertical, keep at least a 17.5 lines per inch difference separating the two patterns.

Test square #9 (accepted $\alpha = .05$, but rejected $\alpha = .10$) represents a combination of dot patterns that is difficult to interpret. While there was nothing unusual about this test square (the patterns were both oriented 90 degrees to the vertical, and the number of lines per inch texture difference was 32.5), something caused the coarse pattern not to have been selected as often as in other test squares. It may be that the fine textured pattern (60 lines per inch) was seen more often as a continuous gray tone, and this may have caused more test subjects to perceive it as the figure.

Test square #1 was rejected. Only in test square #1 were the dots the same size between the two patterns. Since the dots were the same size, and only the texture changed (30.0-27.5 = 2.5), the greater density of the dots may be adding more visual importance to the fine pattern. It may well be that the dots should be larger in the figure than in the ground pattern, while at the same time the number of lines per inch separating the two patterns should be 15.0 or more.

The coarse (patterned) area in both test squares #7 and #12 were chosen significantly more often as figure than the white areas. Test square #12 had one of the highest X^2 values, and the pattern texture was fine (55.0 lines per inch). Test square #7 had a more coarse texture (27.5 lines per inch) and a lower X^2 value. It seems that when only one pattern is used it should be applied to the figure object, and a fine textured screen should be used.

Position in the test square seems to have had no effect on whether a coarse pattern is chosen as figure.

The Preference Test

Each test subject was asked to rank the distinction between the figure-ground relationship for each test square. The purpose of this portion of the test was to discover if the subjects perceived the relationship as stronger or weaker as the texture differences increased or decreased.

The data were tabulated in two groups: those who chose the coarse pattern as figure were assigned to one group, and those who chose the fine pattern as figure to another. The five possible choices of very weak, weak, fairly strong, strong, and very strong were ranked from one through five respectively. Each test square was given a rank depending on the modal strength assigned it by the 88 subjects. Then each test square's texture difference was ranked one through eight (from smallest texture difference to largest). Thus, for each test square two ranks were obtained. The Spearman rank correlation coefficient was computed for each group:

Results:

coarse: $r_s = +.83$
fine: $r_s = +.75$

These were significant results under an H_o that there was no association between the ranks.

There is a positive association between how strong the subjects perceived the figure-ground relationship and the texture difference between two adjacent patterns. Those subjects who chose the coarse pattern as figure felt the association stronger than did those who selected the fine pattern.

Conclusions

Several generalizations may be made from the results of this test:

a) A dot pattern will appear to "stand out" as figure if its number of lines per inch of dots is at least 15.0 less than those of an adjacent dot pattern.

b) A dot pattern may be perceived better as a figure-object if it is oriented 45 degrees to an adjacent dot pattern (given that there is a minimum of 15.0 lines per inch texture difference separating the two patterns).

c) A coarse dot pattern will be seen to "lie above" an adjacent fine dot pattern even if both are oriented 45 degrees (but the minimum of 15.0 lines per inch texture difference must still be maintained).

d) A dot pattern may be more effective as a figure-object if its dots are larger than those of an adjacent dot pattern.

e) When only one pattern is used to create a figure-ground relationship, the geographical area that is being emphasized as figure should be given the pattern. The finer the texture of this dot pattern the more effective the figure-ground relationship.

f) A dot pattern may be perceived as a figure if its texture is so fine that the individual dots can no longer be distinguished.

The general hypotheses stated at the beginning of this test were confirmed by the test results. The map designer can create figure-ground relationships by the use of dot screens having differentiable texture. The results of this test present some guidelines and suggestions for their use. The results also suggest problems that need to be examined for further understanding in the use of dot screens to create figure-ground relationships. The effect of dot sizes of screens needs to be carefully measured. What are the effects of reversing the patterns? That is, are the generalizations of this test applicable to white dots on black? The contrast of brightness is effective in creating figure-ground relationships, but can a threshold be attached to the value range? Do map readers perceive some patterns as lying "above" others when they look at dot patterns that are being used for different values on the gray spectrum? What are the effects when a dot pattern on which the dots are discernible is compared to a dot pattern that is perceived as a gray tone? How do the other map's visual stimuli affect the perception of dot patterns? Cartographers require answers to these questions for the effective use of such prepared media in their aim of making the map a better communicative device.

(1) Henry Castner, "The Role of Pattern in the Visual Perception of Graded Dot Area Symbols in Cartography" (unpublished Ph.D. dissertation, University of Wisconsin, 1964), p. 126.

A PRELIMINARY FORMULATION OF THE EFFECT OF MOTION ON THE QUALITY OF OF VISUAL PERCEPTION

J. ALAN LEACH

The faster one travels less is seen, and yet more is seen. As travel speed is increased, the observer is able to see less of any one object, although he may pass by many more objects. This is significant to the geographer since it may affect his perception during observation. One geographer may prefer to observe change over a period of time from one place, while another may find that a fleeting glance at much landscape may provide a perspective of change over space. Since the motion of an observer will affect his observations, this study attempts to show the relationship of speed to geographic perception in a preliminary formula of observation factors.

The automobile was selected for this study because it is a common method of travel. Furthermore, its speed can most easily be adjusted during experimentation, and the limits of railroad tracks or airline routes do not hinder its travels. The situation for another mode of transportation could easily be extrapolated from the formula developed here for the automobile. In order to standardize the human variable, it is assumed that a person will try to observe as much as possible of the landscape around him in the amount of time available, that he possess vision corrected to 20/20, and that he experience no fatigue.

It is best to begin with the effect of motion. When velocity (v) is zero, certain observation factors can be studied. Sitting still, a person has as much time as he needs to observe any object (a) around him, and consequently time (t) is infinite for observing each object within his sphere of vision. Assume a level and open plane with an infinite horizon viewed from a chair the same height above the ground as the seat of an automobile. Since the observer is allowed to turn his head all the way around, his sphere of vision (Θ) covers a hemispheric area. On a clear day the observer is able to see all objects as far as the horizon. Let "Q", with a maximum value of 1, stand for the observation factor, or the amount of information absorbed about any given object, thereby establishing the quality of that observation. Thus, the observer can make a maximum quality observation about every object within his hemisphere while sitting still, or:

$$Q_{A\Theta} = 1 \quad \text{where } A = \sum_{i=1}^{n} a_i \text{ in } \Theta \qquad (1)$$
$$v = 0$$
$$t = \infty$$
$$\Theta = 360^{\circ} \text{ of visual freedom}$$

To put the armchair into motion imagine that it is placed on one of the new hovercraft being developed for future transportation. To protect the vision of the observer from annoyance by wind, imagine a clear plastic shield surrounding him. As soon as the chair begins to move, the observer views a constantly changing series of visual hemispheres which overlap something like this:

$$\Theta_1 \rightarrow \text{portion } \Theta_1 + \text{portion } \Theta_2 \rightarrow \Theta_2 \rightarrow \text{portion } \Theta_2 + \text{portion } \Theta_3 \rightarrow \Theta_3 \rightarrow \ldots\ldots \rightarrow \Theta_n \qquad (2)$$

A line of fenceposts spaced at even intervals parallel to the observer's path of motion will standardize the number of objects within his sphere of vision at any moment in time. If every post were the same and yet required a moment of the observer's attention, he would find it easiest to look at each one as it passed near him. Since distance equals velocity multiplied by time ($d = vt$), time is inversely proportional to velocity. As velocity is increased, the fenceposts will pass by faster, allowing less time per object (t/a) observation. As the time per object observation decreases, the quality of observation of each object will decrease from maximum and eventually approach zero as velocity is increased, or:

$$Q_{A\Theta} < 1 \quad \text{where } A = \text{constant in } \Theta \qquad (3)$$
$$v > 0$$
$$t/a < \infty$$

However, "a" represents only one object as it passes through Θ. To express the extension of observations to include all objects currently within a sphere, one must count their number from horizon to horizon, and measure the time from appearance to disappearance for one object at a given velocity (v_1):

$$\left(\frac{t}{\sum a_i}\right)\Theta_1 v_1 \qquad (4)$$

This will assume that as one fencepost appears, another will disappear, thus keeping the denominator constant. Further, by keeping the time element constant in the formula $t = d/v$, as the velocity is increased so must the distance covered be and consequently the number of evenly spaced objects passed by. Therefore, the person will have less time to observe any one object, but in traveling faster he will pass more objects to observe.

So far the problem has assumed that the amount of time available for observation in any sphere must be divided equally among the objects. However, no observer will view each object for the same amount of time since such variables as color, advertising gimmicks, and the person's interests affect time allotment. If an object appears over the horizon at a position other than directly in line with the direction of travel, and if it does not immediately command the central attention of the eye, it will not be in sight as long as the possible maximum. Position (p) of the object is measured in degrees of arc away from straight ahead, and is therefore considered a restriction in both attention gaining ability and time visible in Θ. Size of the object is a function not only of its physical dimensions (D), but also the distance (d) it is from the observer. Together, these two variables affect the size of the solid angle of intersection (Φ) of the object in the vision of the eye:

$$\Phi = \frac{D_{a_i}}{d_{a_i}} \tag{5}$$

People are attracted by colors, motion, and the centrality of an object within a group. Advertising or other road signs may alert the observer to objects of special interest. Such intangible variables as these which can command a greater proportion of time for one object are labelled with the letter "c". The interests of the observer may vary tremendously. Although this factor does affect the amount of time various people will spend observing different objects, interest can only be referred to generally as "I" without specific measure. Thus, the attractive power (B) of an object can be measured:

$$B_{a_i} = \Phi\ (c + I) - p \tag{6}$$

When the attractive power of each object in the observer's sphere has been computed, each can be assigned a properly weighted portion of the total attractive power of the sphere.

With a basic understanding of the methods of measuring the qualities of object observations for an observer in motion, the next step is to formalize the restrictions of a car around the observer. The car will be a normal American-model sedan. There are two separate and very distinct possible observer situations in a car; the driver and passenger. The driver's job shall be oversimplified; he will never have to look down at the dials on the instrument panel, nor will the steering wheel, the sunvisors, or the rear view mirror interfere with his vision, and his use of an automatic transmission will require no thought. These eliminations should help equalize the situations of the driver and passenger, although in measuring a real situation such factors would have to be accounted for. The passenger will always ride in the front seat to the right of the driver, and his head position will be identical to the driver's with respect to measurements of the car around him. In both cases, the primary position will be looking straight ahead, and each observer will be assumed to possess 180° peripheral vision. Whether the head or eyes will be turned will not be discussed here; they will be assumed to be used normally.

Windows will be assumed to possess little curvature of glass, and will be measured in flattened rectangular shapes. Objects will not be viewed through the rear window, since this is generally a rare occurence. The exception of the driver who regularly uses his rear view mirror for traffic observation will be ignored. Allowing for head turn, the degrees of visual freedom can be measured from the rear corner posts on one side of the car to the rear corner posts on the other side, with the exception of two small blind spots at the front corner post. Most people do not turn their heads much more than one quarter of the way around to look at any objects passing to the side. Therefore, once an object has passed the initial 180° frontal visual arc, or 90° to each side of straight ahead, the rider is unlikely to observe it further. Thus, a general visual horizon is established behind the rider's head limiting his vision to a half hemisphere ($1/2\ \Theta$).

Window measurements will be discussed without using actual glass area measurements. The front window is a solid angle of visual arc, something like the angle of intersection of the dimensions of an object within the eye (Φ). The sides of the window are limited by the two front corner posts, and can be measured by the number of degrees of visual freedom from the head position. Although the rider and driver have different vantage points, the number of degrees is the same. The base of the solid angle is measured from the eye to the front edge of the car hood. Viewed from the side, this angle is found by simple triangular measurement using the horizontal and vertical distances from the eye to the hood edge. The top of the solid angle is similarly restricted by the top of the windshield. The side windows will be referred to as the near and the far window, since to the driver the left window is near while to the passenger it is the far window. Assuming that the other passenger provides little visual interference, the solid angle can be measured in similar fashion to the front window. The solid angle is limited by the front and rear corner posts of the same side, and by the top and bottom of the window, using a triangular measurement to the position of the eye. Obviously, the near window provides

a great deal of observation space, while the far window is much smaller. Thus, the plastic dome which shielded the observer on the hovercraft is now limited to the window areas of a car. The window measurement restrictions shall be assigned the letter "x". A car seat replaces the armchair, and the moving platform is now the car itself.

With the many different types and conditions of roads, and the varying types of scenery which can surround the traveler, the problem of positioning the car on the road involves several more factors. The car will always remain in the most right-hand lane of the road, thereby standardizing the views to different areas of scenery. It will be assumed that the traffic to the left is never heavy enough to interfere with vision. From the right-hand lane, the measurement of the width of the road to the left (L) will help decide how much scenery can be seen, since on a narrow road the objects to the left will be nearer than when travelling on a wide road. Thus, if speed remains constant on both narrow and wide roads, the scenery to the left would seem to pass by almost as fast as that to the right on a narrow road, while on a wider road the left hand scenery would pass by more slowly. When passing through a deep road cut a view to the left may still be possible over the top of the cut, while to the right nothing but the cut itself may be visible. On a high road fill or a bridge across a valley the opposite may be true. The view downward to the right will be less limited than the view down to the left across the road. Stage (s) is a separate factor which describes whether the road is generally above or below the surrounding topography and scenery. Temporary stages are road cuts and fills, but better examples are mountainside or valley-bottom roads. A factor related to both stage and scenery, but measured differently, is the topography (m) itself. As described above, the level plane will not obstruct the observer's view; however, any rise of surrounding topography will limit his horizon. The closer the hills are, the more visual area is subtracted around the observer, and the more limited is his view.

Outside the car, the weather conditions can also be a limiting factor. On anything other than a clear day, even the slightest haze can interfere with the optimum observation. The various other types of weather will all have different degrees of limitations, and will be referred to as "w". Another weather factor which can limit the visual perception is the condition of the windshield. Also, if dirt, dust, or bugs are on the glass they too may limit the ease of observation. If precipitation is sufficient to require the use of windshield wipers, then the measurements of the window angle should be altered to fit the sweep of the blades. At the same time, some allowance should be made for the poorer, but still possible, vision through the precipitation on the rest of the glass areas. Let this window condition be assigned the letter "f", and let "w" and "f" be subtracted from the optimum condition.

The time of day affects more than the actual measurement of the amount of light available. Near sundown, the quality of the light alters the hue of much of the scenery, or may possibly reflect directly into the eyes of the observer. Before sunrise and after sundown the light may be sufficient to see certain objects but not others. During night driving, visibility will be limited by the range of the headlights, or by the effect and attractive ability of other exterior lights. This factor, which might most easily be measured with an adaptation of the photographic light meter, will be called "n".

Because the driver is an observer there are other factors to consider. Road conditions (r) which demand a certain amount of the driver's attention will include such items as the weather conditions on the surface, the width and surface type of the road, the traffic density, and the layout of the road, e.g. limited access super highway or winding country road. It is necessary to consolidate these items into one factor, since one item may have a positive effect upon another item with a negative effect. Such a situation might result when the effect of very heavy traffic is offset by the use of a super highway designed for that volume of use, or when perfect weather conditions compensate for driving on a gravel road. Only when some of these factors serve as a distraction or discomfort to the passenger will they be computed along with the quality of his observations.

All of the above factors will affect the quality of observation of each object in the sphere either by aiding or restricting the observer's viewpoint:

$$Q_{a_i}\Theta_i = \frac{t\ \Theta/2}{B_{a_i} - x \pm sL - m \pm nw - f - r} \tag{7}$$

where Q = quality of the observation
a_i = object observed
Θ_i = sphere in which object is observed
t = time (See formulas (3) and (4))
B = attractive power of an object (See formula (6))
x = window measurement restrictions
s = stage of road
L = road measurement to left
m = topography limitations
n = light condition
w = outside weather condition
f = condition of windshield
r = road conditions

The total amount of time which each object is within the observer's sphere of vision before the visual horizon is placed over the attractive ability of that object plus all of the observational restrictions, because as the velocity is increased the amount of time will decrease, and thus reduce the value of the quality fraction from the maximum (=1). Restrictions upon the attractive power of the object are expressed in a simple linear relation for the sake of conceptualization. In reality, it is probable that the factors are not quite so simply related. Although this formula cannot provide exact mathematical expressions or numerical results, it does point out the factors involved in quantifying the effect of motion upon the quality of observation, and it does express the general relationship between them.

In conclusion, the velocity of the observer has a tremendous effect upon the type and quality of observations. If, as this study suggests, when the quantity value of observation increases and the quality value decreases, there must be a point at which the two values intersect. To confirm this, further research is needed on the measurement of each factor and on the relationships among the factors presented here. Factors may be changed or even eliminated to fit the condition of the observation being measured, and the method used here for the automobile may be applied to other types of transportation.

For the past two years, the Graduate School of Geography at Clark University has held its annual field camp in Puerto Rico during the three-week January Independent Study Period. In 1967, 65 students (30 graduate students, 25 experienced teacher Fellows, and 10 undergraduates) were quartered at the Luquillo Y.M.C.A. Camp in Palmer.

The experienced teacher Fellows, under the guidance of Dr. Henry Warman, learned field methods and made a case study of the land use dynamics of the northwestern corner of Loiza Municipio. The undergraduates studied beach rock and coastal morphology with Dr. Rodman Snead. Graduate students under the direction of Dr. Jeremy Anderson and Dr. James Blaut conducted a variety of studies whose major focus was the impact of San Juan urbanization and industrial development on the Social and Economic Geography of the northeastern corner of the island.

In 1968, 22 graduate students and one undergraduate translator spent the three-week period in Barranquitas in the Cordillera Central where the facilities of Inter-American University provided an excellent base. Under the supervision of Drs. Anderson, Blaut and David Stea, a wide variety of field studies were undertaken. Studies of peasant agriculture in the region focussed upon problems of marketing, slope-crop associations and tobacco farming. The pueblo of Barranquitas and adjacent towns were the object of urban studies of residential and educational land use, the distribution of retail functions, the influence of plaza location and morphology upon local pedestrian behavior, and the impact of industrial development on a community. Studies in cultural geography were concerned with house-type variation in rural areas and in government housing projects and regional variation in musical taste as reflected by an analysis of jukeboxes. More disparate studies included one of tourism in the southwest portion of the island, one on the island's sports fishing industry and one on the karst topography of the Areciebo-Lares region.

The field camp now follows a semester of training in methods of geographic investigation and the students are responsible for identifying a geographic problem and carrying out its investigation in the field on their own. Puerto Rico was chosen for the field camp setting because it represents the area of Latin American culture most easily accessible to Clark. The benefit of conducting field work in a different cultural setting is that the investigator must take little for granted and is forced to conduct his observations more carefully and to re-examine his own underlying values and assumptions. The field camp has also served to stimulate interest in foreign area research and several theses and dissertations now in progress reflect this experience.

Among the various projects carried out during the past year was the initial phase of an effort to reorganize the map collection, in preparation for the move to a "map library" to be developed in the new space made available in the old library building. The collection has grown extensively in recent years, as Clark has been made a depository for maps of many government agencies. The two major depository collections are those of the Geological Survey and the Army Map Service. In addition the collection has been augmented by the addition of maps from the Coast and Geodetic Survey, the Air Force Aeronautical Chart and Information Center, and other federal mapping agencies. Other maps have been added through gift and purchase, and various cartographic projects have provided an extensive series of maps of the Worcester area. The collection of wall maps and other materials of this type used for teaching purposes has been expanded, while acquisition of aerial photography and map resources which will aid in research and study programs has begun.

THE CONSEQUENCES OF CLOSED POLITICAL SPACE

JOHN B. JACOBS, Jr.

The Problem of Closed Space in Political Geography

The following is a discussion of twentieth century geostrategic and geopolitical thought as it relates to the concepts of open and closed space. These concepts are quite general and can be applied to a number of the fields in geography, but for the purposes of this paper discussion is generally limited to closed political space. This concept is clearly a narrow abstraction from "closed space" in general, but it is a useful and necessary consideration in political geography. The paper is not intended as a survey of the field, and no particular chronological ordering is followed. Certain important writers are selected and their views examined. It is my contention that closed political space is a reality in today's world, and that current thought in political geography on the macro-scale is a consequence of this closed space.

In addition to political space which, it is suggested, is closed, there are considerations of the resource and technological aspects of space which cannot be ignored. In general spatial terms we are presently in a period of "vertical" development within an essentially closed political framework. This point of view is presented by Whittlesey in "The Horizon of Geography," (1) when he discusses the multi-dimensional concept of space.

Man has recognized the world as finite for a long time but it was not until the present century that the job of "...exploring the globe and determining the character of all its parts," was completed. (2) Whittlesey continues that in the "...century after the unity of the oceans was demonstrated, man's sense of space was being enlarged in a new direction by scientific discoveries and mechanical inventions which opened to utilization the third or vertical dimension of the earth's surface." (3) This three-dimensional space is expanded into a multi-dimensional concept encompassing time (velocity, pace and timing), and eventually quality of the environment.

That space in these terms is open is not questioned here, for the case can easily be made that technological-resource-space is open, if not unlimited. It is the purpose of this paper, rather, to discuss the consequences of the closing of earth space due to exploration, discovery and eventual political control over all available lands, which resulted in the present condition of closed political space.

Malin, in discussing space and history in 1944, demonstrates that the idea of closed space "...is derived from the fact that all unoccupied lands, or lands occupied by underdeveloped peoples, have been appropriated--that no wholly new lands are available." (4) The consequence of this assumption of closed space is that man must adjust both his attitudes and way of life. Competition for space and resources increases, and as a result national policies are affected.

Included in this closed space of which Malin speaks are considerations which lead him to conclude that, "the twentieth-century conviction of closed space...is a matter of closed mind more than closed space, or a closed world. The world is no more closed in 1946, than in 1446 ...." (5) Such considerations are economic, technological, scientific, ideological and social functions that have no necessary space relations which conform to closed space considerations of the usual order. "It may be said that these forces recognize no political boundaries. Yet they are mobile, sometimes rapid, and penetrating. Their space is a more 'open' entity, whose boundaries can advance with astonishing rapidity but can also regress." (6)

But what is the nature of political space, if space in the closing-of-the-frontier sense cannot, according to Malin, be closed because of a variety of factors? In The Science of Geography, Cohen points out that "A primary characteristic of political space is its 'closed' quality." (7) In fact, political space is necessarily "finite" and "highly specific." In most cases actual landscape features mark the edge of a political unit. The fact that "...common hunting grounds, the land condominia, and no-man's-land that characterized thousands of years of history on land have been replaced by the border problems of the modern world," (8) illustrates the point that political space, on a global scale, is closed.

The importance of Cohen's contention that political space is closed can best be examined in relation to Malin's assertion that closed space is a matter of "closed mind." Malin is clearly thinking in terms of Whittlesey's multi-dimensional geography. The closed world of

1946 (or of 1446 for that matter), is readily transcended by the economic, technological, scientific and other activities of man, over time. But Cohen is a step removed, as he is dealing with strictly political space. To the political geographer the knowledge that earth space is totally under political control is as important as an awareness of open technological space is to the resource or economic geographer, or to the historian. Thus open space is accepted within the politically closed framework, but the fact that political space is effectively closed, cannot be disguised.

All of the land surface on the earth is effectively politically organized, so that peaceful political expansion is no longer possible. Twentieth-century global politics are largely a matter of rearrangement within a power of framework which has evolved out of the hot and cold wars of the last seventy years. Malin's economic, technolgical and social functions, which are of an essentially non-spatial nature, place unusual stresses upon this closed political system. "Indeed, in the demands that the originally non-political processes make upon the internal structure of a given political system or subsystem one discovers some of the most important problems in political geography." (9)

But what of Malin's contention that the world of 1446 was not essentially different from the world of 1946? The pressures exerted upon the political framework (an open framework in 1446, by our definition) did not have global repercussions: first, because technology had clearly not advanced to a sufficient degree; and second, because the political framework was not closed. That is, non-spatial pressures cannot place stresses on every part of a system which is open, having empty spaces, common lands, and unexplored territories. The wars of the twentieth century, by way of contrast, demonstrate the global consequences of political action in a closed political framework. Science and technology become, in terms of closed political space, elements of sophistication in war and international interaction. Other aspects of this problem are considered in the following discussion of Mackinder.

Land Power

The first significant documentation of the consequences of the closing of political space is to be found in Mackinder's writings. Developments and variations of this main theme are found in subsequent works by other writers, politicians, and military strategists, and to a large degree they are expressed in the political structure of the modern world.

In 1904, Mackinder presented a global doctrine in his article, "The Geographical Pivot of History." (10) In this paper he "...stressed the point that mankind, with no new lands to discover, explore, and exploit, faced a future within a closed globe and his activities were limited to the ordering of his living space within this known available space." (11) For Mackinder, the Columbian epoc was an age of discovery and exploitation which ended at the turn of the century. Unoccupied territory, that is politically unoccupied land, was no longer available for a claim of ownership. Political expansion had been effectively limited.

The consequence of closed political space, according to Mackinder, is an arrangement of landpower on the earth which attempts "...to combine great space and location in a view of the geographical setting that attributed pre-eminence to one continental portion of the world." (12)

The consequences of this closed space view of the political world become clearer. With the whole earth surface politically occupied, the states are left with the prospect of ordering their activities within the system. A state can no longer expand at will into other territories without the risk of war with a peer state. Spatial activity is effectively limited to reorganization of politically occupied territory. Pessimism and a sense of inadequacy evoked by visions of this closed world are expressed in the catchwords of the times: "the passing of the frontier, closed space, the geographical pivot with the monopoly of power, the capacity to produce, the struggle for the most valuable space and remaining resources, the end of opportunity...." (13)

In conclusion of the discussion of Mackinder, let it be mentioned that there is one important aspect of twentieth-century thought which can be understood in terms of closed space considerations. This is the rise of Geopolitik in Germany as an outgrowth of Hegelian philosophy and the space concepts of Ratzel and Mackinder. The nature of the political and military actions which in part resulted are generally known. An interesting question arises, however, with regard to the exact nature of the relationships between the World Wars and the concept of closed space. Do the wars represent an active response on the part of the German nation to what was perceived as essentially open space, land free for the taking? Or are the wars of the twentieth century directly the result of pressures exerted by closed political space? Malin, for example, concludes that "In a direct sense World War I and World War II were the inevitable consequences of the operation of this body of (closed space) ideologies." (14) An examination of the elements of this problem is not presented in this paper, although the matter is clearly of vital concern.

Sea Power

Turner and writers of the Ratzel-Mackinder-Hauschofer line viewed space in terms of landpower and continentality. However, at the same time, writers like Alfred T. Mahan and Nicholas Spykman were evolving seapower-oriented global views, which differed in several respects from the landpower conception of space.

Mahan was an unusual mixture of the nineteenth and twentieth centuries. His writings show influences of nineteenth-century open space as well as twentieth-century closed space. It would be possible to suggest that, in terms of strict political space, Mahan was a product of the closed space school. But the argument would be academic and would nicely avoid the main issue, because "to Mahan closed-surface did not mean a closed world, because the nineteenth-century science and its application through machines was being transferred in the twentieth century to new regions for a continuation of the process there." (15)

Mahan's strategic thinking developed out of a growing awareness of the closing of space in a global sense. That his interests were in the fields of naval history and strategy is of prime importance, for in a closing world in which empty space was rapidly being appropriated "...it is probable that the wind was already blowing in the direction of maritime expansion and new naval rivalries." (16)

Cohen describes Mahan's view of the world as Eurasian-centered, with Russia functioning as the dominant land power in Asia. Mahan maintained that a major zone of conflict between Russian landpower and British seapower was located between the thirtieth and fortieth parallels in Asia, and that "...world dominance could be held by the Anglo-American alliance from key land bases surrounding Eurasia because of the inherent advantages of sea-movement over land-movement. Indeed, Mahan predicted that an alliance of the United States, the United Kingdom, Germany, and Japan would one day hold cause against Russia and China." (17)

This view of the world reminds one of Mackinder's World-Island concept, although Mahan, from the seaman's point of view, considers the land-locked position to be strategically weaker than the maritime. Although Mahan's point of view is not one of closed space, his predictions of future alignment of powers reminds one of the closed space power framework of Mackinder.

Spykman, writing in 1944, states that the "...important change in the organization of power was first comprehensively recognized and analyzed in 1890 by Alfred Thayer Mahan in his book The Influence of Sea Power upon History, 1660-1783. It was, however, the British geographer Sir Halford Mackinder who, in 1904, first studied in detail the relations between land (and) sea power on a truly global scale." (18) Spykman thus displays, in his global views, aspects of this double heritage.

Spykman views poltical space as closed, and emphasizes the fact that "any attempt to consider the geopolitical relationships among the states of the Eastern Hemisphere must first emphasize the fact that the total earth's surface has, today, become a single field for the play of political forces." (19) Thus, the power structure is such that the foreign policy of any sovereign state is necessarily affected by the policies and actions of any other state.

Strategically, Spykman's concern was with the Rimland, which was essentially Mackinder's Marginal Crescent. The key to world political strength was in the control of this Rimland territory. That this doctrine is not adequate in today's world is not the issue. What is important is the realization that Spykman's global view, like other twentieth century global views, is merely a strategic reorganization of closed political space.

Conclusion

In the years which followed World War II, the rise of air power and nuclear capability demanded re-evaluation of earlier geostrategic views. Writers in the 1950's, and 1960's, Alexander P. de Seversky, John Slessor, George F. Kennan, and Saul B. Cohen, responded to these changes in their strategic considerations. The world views of these men, however, are also direct consequences of closed political space. Economic and military capabilities, however, have greatly complicated the global picture, but the fact remains that political space in the twentieth century remains effectively closed.

(1) Derwent S. Whittlesey, AAAG, XXXV (March, 1945), pp. 1-35.

(2) Ibid, p. 13.

(3) Ibid, p. 15.

(4) James C. Malin, "Space and History: Reflections on the Closed-Space Doctrines of Turner and Mackinder and the Challenge of Those Ideas by the Air Age," Agricultural History, XVIII (1944), p. 65.

(5) James C. Malin, The Grassland of North America (Ann Arbor, Mich.: 1947), p. 335.

(6) NAS-NRC, The Science of Geography (Washington, D.C.: 1965), p. 33.

(7) Ibid, p. 32.

(8) Ibid.

(9) Ibid, p. 33.

(10) Geographical Journal, XXIII (1904), pp. 21-37.

(11) Malin, "Space and History", p. 67.

(12) NAS-NRC, op. cit., p. 40.

(13) Malin, The Grassland of North America, p. 331.

(14) Ibid., p. 332.

(15) Malin, "Space and History," p. 72.

(16) Gerard Fiennes, Sea Power and Freedom (London, Skeffington, and Son., Ltd., 1918), p. 222.

(17) NAS-NRC, op. cit., p. 45.

(18) Nicholas Spykman, The Geography of the Peace (New York: Harcourt, Bros. & Co., 1944), p. 35.

(19) Ibid.

Dr. Stea has been teaching a new course variously known as Psychogeography, Psychography, and Behavioral Sciences and Environment. The students are primarily from the departments of Geography and Psychology; the following titles of term papers indicate the scope of subject matter introduced and of student interests.

The Geo-behavioral Environment as a Determinant of Fear in Boys (Jack Pransky); The Effect of Physical Design upon Friendship Formation in Women's Dormitories (A. Sandra Abramson); A Study of the Geography Workroom, Clark University (Ingrid D. Hansen); The Micro-environment of the Bus--A Study of the Worcester Bus Company (Merrie Muir and Richard Jackson); A Study of Seating and Relationship to Behavior in the Clark University Library (C.J. McConnell and Alcy Frelick); Environmental Perception of Dormitories (A. Sandra Abramson and Duncan MacInnes); Perception of Jonas Clark Hall Based on Empirical Study and Subjective Comment (Howard Zack and James Case); Graduate Housing (K.A. Spencer, Jr. and Lowell Fancher); Suggested Redesign of Clark University (D. White and R. Chadis); Perception of Worcester Determined by Mobility (Art Patterson and Henry Soroka); Conceptual Maps of New England (Zaido Dowd); The Environment of Kevin Lynch (Arthur Krim); Image of San Cristobal Las Casas, Chiapas, Mexico (Denis Wood); Perception of Worcester by Clark Students (Elaine Hakkila and Carolyn A. Bartick); The Legacy of Gulio (Herbert Aarons); People's Macroimagery of their Environment (K. Lawrence); Analysis of Zuni Culture with Reference to its Possible Displacement to New England (Neal Epstein and Walter Frankel); Quechuan Acculturation: An Immodest Proposal (Joan C. Larcom); Environmental Design and Planning in Utopian Societies (Tom Baxter); Sense Modalities, Language and Space (Irving Schwartz); and Perception of Traveled Distance (Ingrid D. Hansen).

A course in FORTRAN IV computer programming was offered during the Independent Study Period by Richard Howard. Basic principles of programming were presented and each student had the opportunity to prepare programs to run on the Clark IBM 1620. The course was extended into the Spring semester with more advanced topics being presented. Emphasis was placed on the computer's ability to manipulate words and letters as well as numbers. Examples of computer information storage and retrieval programs, as well as fundamentals of computer generated maps and graphs were provided as examples. Participants selected projects to be programmed for the IBM 360/40 system.

A MORPHOLOGICAL STUDY OF HOUSING IN BARRANQUITAS, PUERTO RICO

HERBERT K. McGINTY AND ROBERT P. DONNELL

With the exception of Nelson's study of Mexican townscapes and Augelli's study in Eastern Puerto Rico, the residential morphology of Latin American towns is ignored by the recent literature. (1) The purpose of this study, carried on in the field in January, 1968, was to delimit the residential land use in Barranquitas, Puerto Rico, determine its distinctive characteristics and analyze the patterns of residential morphology observed in this mountain town. Because of the time limitation in the field the study was restricted to the original pueblo of Barranquitas, excluding outlying areas annexed in recent years. (2)

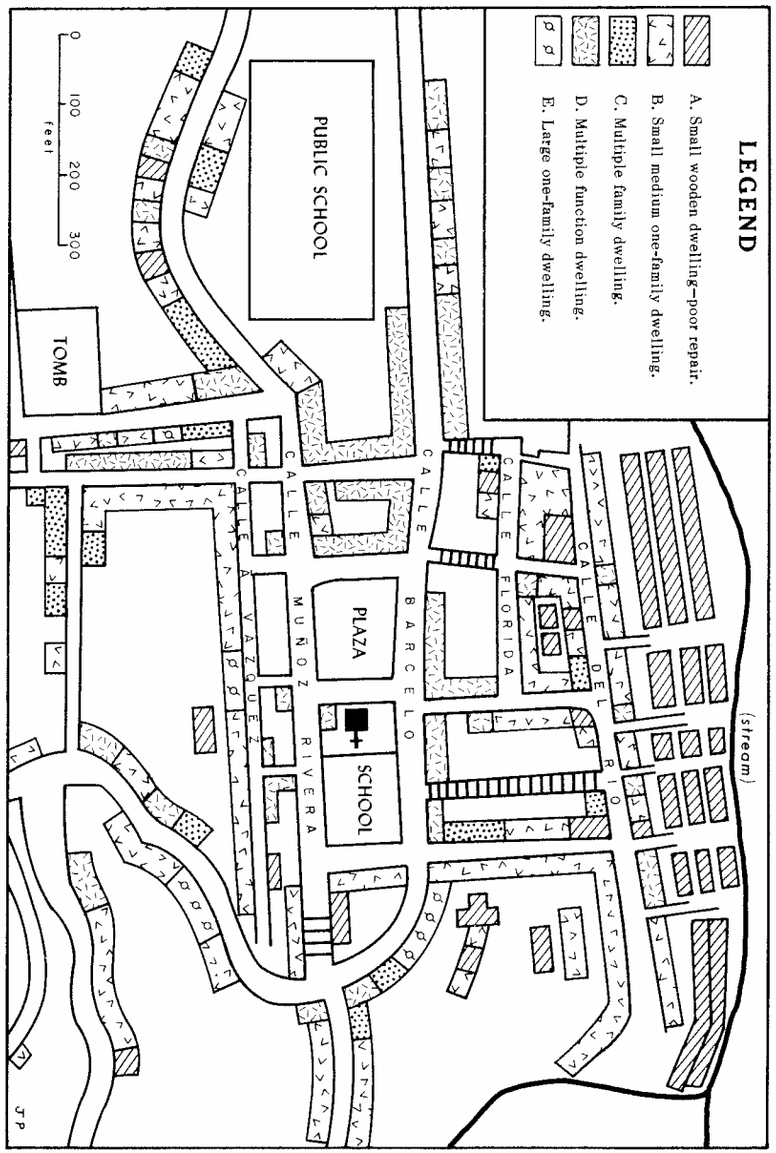
The principal methodology used for this study was that of field mapping, observation, and interview. An initial introduction to Barranquitas was obtained from aerial photographs and topographical maps from which working base maps were prepared. Before a residential classification system could be developed, a preliminary survey was made to obtain an overview of the pueblo and to determine locations and types of urban residential housing. Wellington D. Jones' study, "Field Mapping of Residential Areas in Chicago," (3) was selected as the basic guide for our classification, although the Puerto Rican situation required extensive modification of Jones' scheme. In deriving the classification system for residences we employed such observable elements of form as (a) size of structure (number of rooms), (b) number of stories, (c) spacing of buildings, (d) upkeep of buildings and grounds, and (e) construction material, as well as such elements of function as (f) the number of families inhabiting a structure, and (g) non-residential functions performed in the residence. In the resulting classification system five housing categories were established as representing the range of residences in central Barranquitas.

(A) small to medium sized (1-3 rooms) wooden structure in poor repair with urban spacing (25 feet or less between structures) (4)
(B) small to medium 1-family dwellings, fair-good upkeep, urban spacing
(C) multiple family dwellings, fair-good upkeep, urban spacing
(D) multiple function residences, fair-good upkeep, urban spacing
(E) medium to large (more than 3 rooms), 1-family residences, good-excellent upkeep, urban spacing.

Types B, C, D, and E were subdivided by the number of stories they possessed (1, 2, and 3, etc.) and also by their construction material, whether wood (indicating a wood frame structure with wood, asphalt, or metal siding) or concrete (indicating construction from concrete block, reinforced concrete, or stucco). The classification of a residence's upkeep is based to a large extent on the condition of the facade, the most visible and well-kept part of house exteriors in Barranquitas. The house types found were recorded on base maps from which the map "Classification of Residences in Central Barranquitas" was compiled.

This map shows that the predominant housing type is B, the small to medium sized 1-family dwelling in fair-good repair. Type B houses are predominantly single stories, with a larger proportion constructed of wood rather than concrete. This type has the largest range and is found throughout town. In the fairly densely occupied area between the Plaza and the Calle del Rio slum area where type B structures dominate, the mean number of residents per house was found to be five, while the mean number of residents per room was nearly two. The average length of residency by present occupants of this area was found to be seventeen years.

The better quality dwellings tend to cluster along the top and sides of the ridge which defines the center of town. Type E houses, including the largest and best-kept single family residences, are predominantly concrete structures of both one and two stories. They are few in number, but they occupy some of the better hillside locations. Very similar in appearance but more numerous and widespread and less predominantly concrete are the multiple family dwellings (type C), in most cases multiple storied structures accommodating two or three families. The area of Barranquitas south of the Plaza in which are located most type E and C residences as well as numerous type B dwellings is considerably less dense than areas north of the Plaza. The mean number of residents per house is five, while the mean number of rooms per house also approaches five. A great many of the structures, especially those of concrete, have been built during the last twenty years; the average length of residency by present occupants is nine years.



CLASSIFICATION OF RESIDENCES IN CENTRAL BARRANQUITAS

Not surprisingly, multiple function dwellings (type D) are predominant around the Plaza and along the main roads out of town. With few exceptions these are multiple storied structures of wood and concrete, whose first floors perform commercial functions and whose upper floors serve as residences. Nelson notes that in Mexican towns "functional specialization is not great." (5) In Barranquitas most commercial establishments also serve as residences as do some manufacturing concerns.

Type A residences (small to medium sized wood houses in poor repair) dominate the Calle del Rio slum area along the north edge of town, occupying land owned by the Pueblo of Barranquitas. These one-story shacks are constructed of wood with metal roofs; they are provided with electricity but lack plumbing facilities. Most of these houses are not located on paved roads but have access by stepways and paths leading from Calle del Rio. This densely populated area occupies the most topographically inferior location in Barranquitas, on the flood plain and hillside sloping down towards the river. The average number of occupants per house is six, while the mean number of residents per room is two. As in the case of other slum areas in greater Barranquitas a correlation exists between such densities and the number of years of occupance. Type A houses are generally the older 1-story dwellings that have been occupied the longest period of time by present residents. The appearance of isolated wooden shacks in areas of better housing reflects the frequent phenomenon of a shack remaining after its residents have moved into a newly constructed concrete house adjacent to it. Housing conditions are considerably worse away from the paved streets, but the conditions do not necessarily worsen the greater distance from the street. In such lower income areas more attention is directed toward the upkeep of the house's facade rather than to its other sides, as is the case with the residence's interior as opposed to its exterior.

This study revealed a significant relationship between location and the quality of housing. The best housing is found in those parts of town which command a good view due to topography or where location on a main street permits using the street level floor for a commerical function, and poor housing typifies inferior locations. Future research could profitably explore the following questions: (a) does the same generalized conclusion hold in other Puerto Rican towns; and (b) how do the residents perceive their home site location and in what way does this influence the quality of their housing?

(1) Howard Nelson, "Townscapes of Mexico: An Example of the Regional Variation of Townscapes," Economic Geography, Vol. 39, (1963), pp. 74-83. John P. Augelli, "Rural Settlement Types of Interior Puerto Rico: Sample Studies from the Upper Loiza Basin," Symposium on the Geography of Puerto Rico, ed. by C. F. Jones and R. F. Fico (Rio Piedras, Puerto Rico: University of Puerto Rico Press, 1955), pp. 325-336.

(2) The 300 residential units in this central area have an estimated population of 1600 out of the total 1960 population of the pueblo of 4684.

(3) Wellington D. Jones, "Field Mapping of Residential Areas in Metropolitan Chicago," Annals of the A.A.G., Vol. 21 (1931), pp. 207-214.

(4) Jones defined urban spacing as being 50 feet or less between structures, but central Barranquitas residences are too compactly spaced for this definition.

(5) Nelson, p. 82.

The Graduate School of Geography and the Department of Psychology cooperated during the Spring of 1968 in an interdisciplinary faculty seminar. This represented a "first" of sorts, although teachers of environmental design and behavioral science have engaged in similar efforts in the recent past. About half the geography faculty and one quarter of the psychology faculty participated in the informal, often intellectually free-wheeling gatherings. Discussions were led by psychographers and others from within and outside Clark. Guests included representatives of the National Institute of Health, the University of Michigan, M.I.T., and Columbia University. Among the topics touched upon were the relations of environmental stimulation to perception and cognition; the role of stimulus variation in producing meaningful experience; population density, dispersion, and stress; simulation and representation of designed environments; cities as learning media; the "urban imagery" produced by certain kinds and patterns of vehicular movement; and how children learn to "map" their environments.

THE APT MAP: A NEW TOOL FOR CARTOGRAPHIC PRESENTATION

WILLIAM CAROLAN

The "Apt" Map (Area Proportional To) demonstrates that base maps constructed on a base other than that of surface area can maintain the familiar shape of general areas, the familiar shapes of constituent units, and the familiar relative positions of constituent units.

Data relating to the occurrence of social, political, and economic phenomena, as well as to that of physical phenomena, can be presented meaningfully on such maps.

On this particular map state areas were made proportional to population by use of a Saltzman Enlarger-Reducer Projector. From a common base map this device projected onto a tracing table the outline of each state enlarged or reduced by a factor equal to

$$\sqrt{\frac{\text{West Virginia's area}}{\text{Other State's area}}} \times \sqrt{\frac{\text{Other State's population}}{\text{West Virginia's population}}}$$

West Virginia was the base state because it approximated most closely a theoretical base state with area equal to

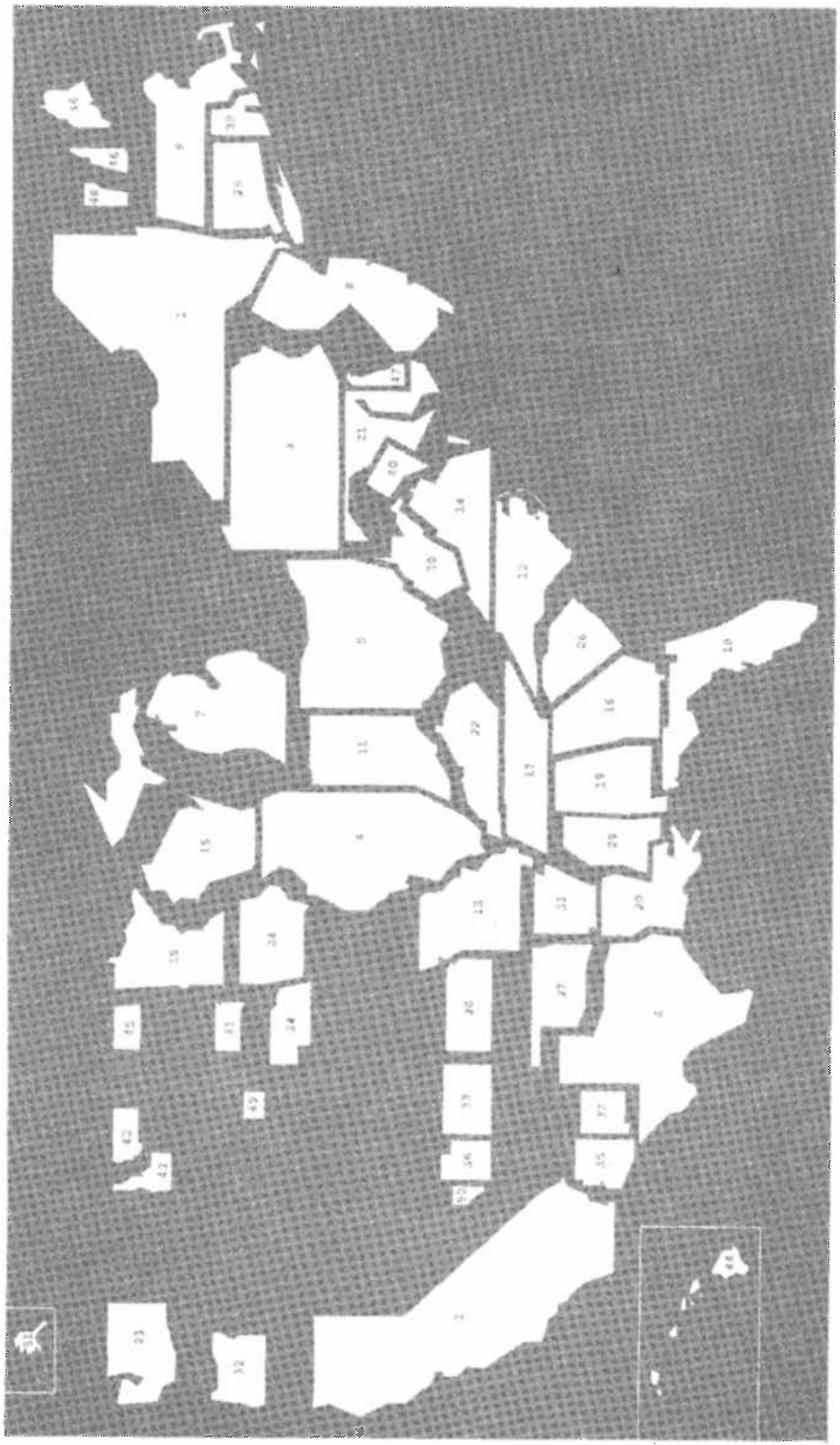
$$\sqrt{\frac{\text{largest state area}}{\text{smallest state area}}}$$

and population equal to $\sqrt{\frac{\text{most populous state}}{\text{least populous state}}}$

Table 1

States Ranked by Population

Rank		1960 Population	Rank		1960 Population
1.	New York	16,782,000	27.	Oklahoma	2,328,000
2.	California	15,717,000	28.	Kansas	2,179,000
3.	Pennsylvania	11,319,000	29.	Mississippi	2,178,000
4.	Illinois	10,081,000	30.	West Virginia	1,860,000
5.	Ohio	9,706,000	31.	Arkansas	1,786,000
6.	Texas	9,580,000	32.	Oregon	1,769,000
7.	Michigan	7,823,000	33.	Colorado	1,754,000
8.	New Jersey	6,067,000	34.	Nebraska	1,411,000
9.	Massachusetts	5,150,000	35.	Arizona	1,302,000
10.	Florida	4,952,000	36.	Maine	969,000
11.	Indiana	4,662,000	37.	New Mexico	951,000
12.	North Carolina	4,556,000	38.	Utah	891,000
13.	Missouri	4,320,000	39.	Rhode Island	859,000
14.	Virginia	3,967,000	40.	District of Columbia	764,000
15.	Wisconsin	3,952,000	41.	South Dakota	681,000
16.	Georgia	3,943,000	42.	Montana	675,000
17.	Tennessee	3,567,000	43.	Idaho	667,000
18.	Minnesota	3,414,000	44.	Hawaii	633,000
19.	Alabama	3,267,000	45.	North Dakota	632,000
20.	Louisiana	3,257,000	46.	New Hampshire	607,000
21.	Maryland	3,101,000	47.	Delaware	446,000
22.	Kentucky	3,038,000	48.	Vermont	390,000
23.	Washington	2,853,000	49.	Wyoming	330,000
24.	Iowa	2,758,000	50.	Nevada	285,000
25.	Connecticut	2,535,000	51.	Alaska	226,000
26.	South Carolina	2,383,000			



GRADUATE SCHOOL AND ALUMNI NEWS

REPORT FROM THE DIRECTOR

Past annual reports to alumni have emphasized our School of Geography's plans for development. This issue of The Monadnock reveals something of the scope and pace of this development. New staff appointments; program experimentation; preparation for expansion of the School into the first two floors of the old library; the changing profile of graduate student background and interests; restructuring the undergraduate major; two large-scale research projects; and continuation of major training programs--all are chief among current operational concerns.

But what is happening within American society and within American education demands reassessment of the context within which Geography functions at Clark and Clark functions on the American graduate school scene. The challenge to redefine the goals of all the components that make up Graduate education; the need to anticipate rather than to respond to forces calling for change; the desire to build on past traditions, not as a retreat into the past but as the base for new departures--these are the broader operational milieu. We hold strongly to the urgency for pointing Geography in socially relevant and scientifically grounded directions. We believe that Geography should be tied to the methods and spirit of sister disciplines. We feel that students must become partners of function and spirit in this educational enterprise. And thus it is that joint programs with Psychology, History, and (next year) Government, student-faculty dialogue, recruitment of Negro and other economically-disadvantaged students, and research in perception and foreign-area development reflect our directions of involvement and help to justify our School's major growth program. We have far more problems to solve than have been successfully met to date, but knowing where we want to go and what we want Geography at Clark to be is more than half the battle.

This June marks Raymond E. Murphy's retirement, after 22 years of service as Professor of Economic Geography, a past director of the School of Geography, and Editor of Economic Geography. Clark and American Geography owe much to Raymond, who has charted new directions in urban geography and has trained a generation of American urban geographers. Raymond has agreed to edit Economic Geography this coming year, while the search for his successor continues. Another loss is that of Rodman Snead, Associate Professor of Geography, who will take up a new post in Geomorphology with the Geography Department of the University of New Mexico.

On the credit side are the appointments to permanent posts of James Blaut as Professor of Geography (Cultural and Philosophy), Richard Peet as Assistant Professor (Economic Geography), and Roger Kasperson as Assistant Professor of Geography and Government. Robert Kates will receive his appointment to full Professorial status this July. Richard Howard will expand his activities as affiliate lecturer in Computer Science, Carolyn Weiss has joined our staff as Research Cartographer, and Gwyn Rowley will spend next year with us as Visiting Lecturer in Urban Geography. We are continuing the search for appointments to permanent posts in Economic, Urban and Physical Geography to bring our faculty to fourteen in number.

During the coming year, the opening of the new Goddard Library requires that we develop a full-scale reading room in the Libbey Library. We plan to stock the room liberally with journals and are most anxious to place duplicate full sets of English-language geography journals in Libbey. Should any of you be in a position to donate surplus sets to the Workroom for this purpose, we would be most appreciative. Target date for developing Libbey as a reading room is February, 1969, at which time the library's full geography collection will have been removed to the new Goddard Library.

Paul B. Cohen

THE WORKROOM TODAY

MASTER OF ARTS STUDENTS

JAMES PAUL BARBATO. Assumption College, B.A.; Clark University, M.A. in Ed.; Physical Geography; Career Objective: College Level Teaching.

RUSSELL BECKETT CAPELLE, JR. Dartmouth College, A.B.; Industrial Geography; Career Objective: Industrial Location Consulting; Thesis Topic: Industrial Location Theory Applied to Vermont Ski Areas.

KANG-TSUNG CHANG. National Taiwan University, B.S.; Cartography and Quantitative Methods; Career Objective: College Level Teaching; Thesis Topic: Psychophysics.

WILLIAM ZACK CLARK, JR. Concord College, B.A.; Cartography.

ROBERT PHIPPEN DONNELL. Boston University, B.A.; Historical Geography and Geomorphology; Career Objective: College Level Teaching; Thesis Title: "Early Settlement and Sequent Occupance of Martha's Vineyard, Massachusetts."

INGRID DOROTHEA HANSEN. Wellesley College, B.A.; Cultural Geography, Psychography.

GORDON ALFRED HINZMANN, JR. Wayne State University, B.A.; Economic Geography, Climatology; Career Objective: College Level Teaching or Private Consulting; Thesis Title: "The Influence of the Interstate Highway System on Urban Morphology: Prospects for the Linear City."

STEPHEN P. HOBART. Carroll College, B.A. B.A.; Urban Geography; Career Objective: College Level Teaching; Thesis Topic: Transportation Land Use.

JOHN B. JACOBS, JR. Clark University, A.B.; Political Geography; Career Objective: College Level Teaching; Thesis Title: "The Ideal State as an Ecosystem."

JONATHAN ALAN LEACH. Dartmouth College, A.B.; Economic Geography; Career Objective: Industrial Location Consulting or Transportation Planning; Thesis Title: "The Effect of Competition on the Potential Market for High-Speed Rail Service between Boston, New York, and Washington."

BERNARD MAY, JR. Miami University (Ohio) B.A.; Economic and Urban Geography; Career Objective: Economic Development in Underdeveloped Areas.

HERBERT KENDRICK MCGINTY. Duke University, A.B.; Political Geography.

D. DAVID MILLER. University of Durham, England, B.A.; Geomorphology.

ALAN PHILIP MUIR. Urban Geography; Career Objective: College Level Teaching; Thesis Title: "Speculative Industrial Buildings in New England."

MERRIE ELLEN MUIR. Clark University, A.B.; Career Objective: Secondary School Education; Thesis Title: "The Development of a Curriculum for the Teaching of Map Skills to First Graders by the Use of Aerial Photographs."

RUSSELL W. MUNCASTER. Waterloo Lutheran University, Ontario, B.A.; Urban Geography; Career Objective: University Teaching; Thesis Title: "Theoretical Spatial Implications of Mixed Central Place Hierarchies."

LEE EDWIN PHILLIPS. Dartmouth College, A.B.; Marketing Geography; Career Objective: Planning or College Level Teaching and Research; Thesis Title: " Weather Sensitivity Indices for Retail Sales in Worcester, Massachusetts."

DAVID A. SMITH. Clark University, A.B.; Economic Geography; Career Objective: Regional Economic Development Consulting; Thesis Title: "An Analysis of the Characteristics of American Industrial Parks."

WALTER C. SWAIN. Beloit College, B.A.; Agricultural Geography; Career Objective: Agricultural Development in Tropical and Subtropical Areas; Thesis Topic Agricultural Informations: Subsistence to Commercial Orientations.

A. KEITH VAN WINKLE. Middlebury College, B.A.; Career Objective: Secondary School Education.

W. DAVIS VAN WINKLE. Middlebury College, B.A.; Political Geography; Career Objective: Private Secondary School Education; Thesis Title: "The Political Geographic Aspects of the New Hampshire Liquor Laws."

DENIS WOOD. Western Reserve University, B.A.; Thesis Topic: Jukebox Geography of Puerto Rico.

DOCTOR OF PHILOSOPHY STUDENTS

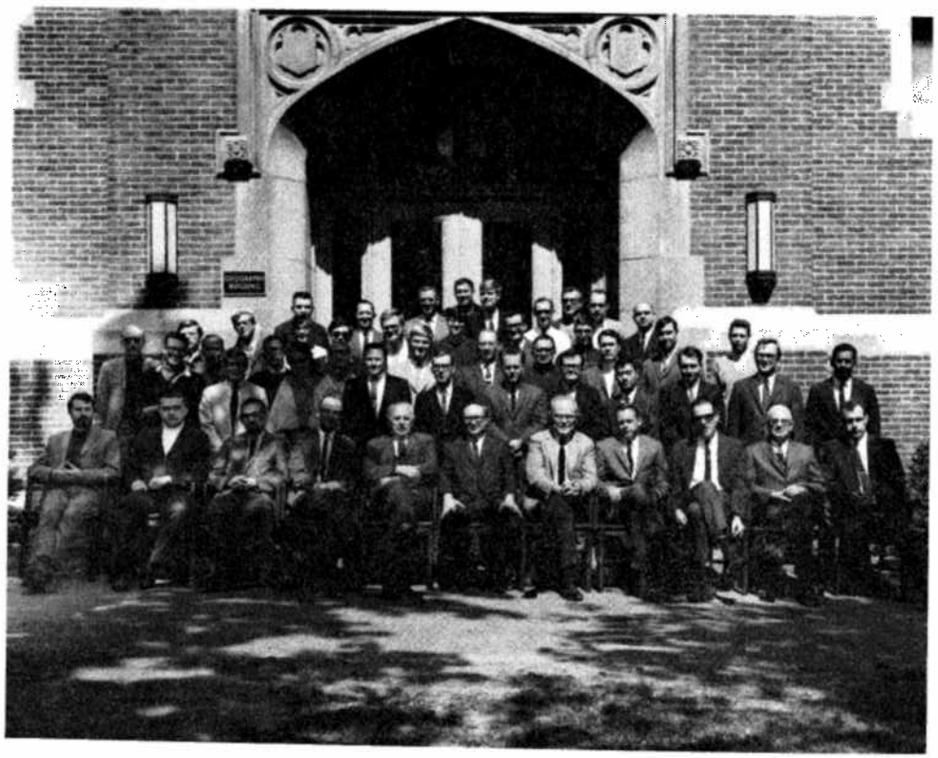
PAUL A. BLACKFORD. Riverside, A.A.; University of Hawaii, M.A.; Tropics, Resources, Geomorphology; Career Objective: Research Management or College Level Teaching.

WILLIAM B. CAROLAN, JR. University of Arizona, B.A.; Oregon State University, M.S.; Political-Population Geography.

BORDEN DEVON DENT. Towson State College, B.S.; University of California-Berkeley, M.A.; Cartography.

KENNETH GILLMAN. Brooklyn College, B.A.; Pratt Institute, M.U.P.; Urban Geography; Career Objective: City Planning and College Level Teaching.

THE GRADUATE SCHOOL, 1967 - 1968



First Row: Mr. J. Richard Peet, Mr. George F. McCleary, Jr., Dr. Jeremy Anderson, Dr. William A. Koelsch, Dr. Samuel Van Valkenburg, Dr. Saul B. Cohen, Dr. Raymond E. Murphy, Dr. Rodman E. Snead, Dr. James M. Blaut, Dr. Henry J. Warman, Dr. David Sharon.

Second Row: Denis Wood, Bernard J. May, Ingrid D. Hansen, Don Fancy, William Z. Clark, Mr. Richard A. Howard, Borden D. Dent, Kang-Tsung Chang, Robert W. Thompson, David A. Smith, Chelvadurai Manogaran.

Third Row: Lewis D. Rosenthal, Henry McCutcheon, James P. Barbato, Irving A. Schwartz, J. Alan Leach, William B. Carolan, Constantine Karavetsos, Stephen Hobart, Gordon A. Hinzmann, William White.

Fourth Row: Walter C. Swain, Arthur J. Krim, Karen Thompson, John B. Jacobs, Jr., Russell W. Muncaster, Robert P. Donnell, Robert J. LeFave, Anthony J. Bonaquisti, Robert Mulcahy.

Fifth Row: Russell B. Capelle, Robert S. Weiner, Harry S. McPhilimy, D. David Miller, Herbert K. McGinty, Z. Lawrence Lipchinsky, Thomas Eden, Richard H. Jackson.

ANDREW DEWEY HASTINGS, JR. University of New Hampshire, B.S., M.S.; Climatology; Career Objective: Professional Geographer in Federal Service. Dissertation Topic: The Last Millenium of Climatic Change in Greenland.

ZELEK LAWRENCE LIPCHINSKY. University of Florida, A.A., B.S., M.S.; Geomorphology; Career Objective: College Level Teaching and Administration.

RICHARD H. JACKSON. Brigham Young University, B.S., M.S.; Historical-Cultural Geography; Career Objective: College Level Teaching and Research; Dissertation Topic: Vision Versus Reality: The Mormon Perception of the Environment, 1840-1869.

RALPH A. LENNON, JR. University of Massachusetts, B.A.; Clark University, M.A.; Political Geography; Career Objective: College Level Teaching and Research; Thesis Title: "Toward a Definition of the Small State".

HENRY R. MCCUTCHEON. McMaster University, Ontario, B.A.; Clark University, M.A.; Political Geography; Career Objective: College Level Teaching; Dissertation Title: "The Political Areal Organization of Massachusetts."

HARRY S. MCPHILIMY. George Washington University, A.B.; Physical Geography; Career Objective: Research Management.

RICHARD O. RIESS. University of Rochester, B.A.; Columbia University, M.A.; Agricultural, Urban, and Settlement Geography; Career Objective: College Level Teaching; Dissertation Title: "Changing Patterns in Peasant Agricultural Areas as a Result of Metropolitan Expansion."

LEWIS DANIEL ROSENTHAL. City College of New York, B.B.A.; New School for Social Research, M.A.; Political Geography; Career Objective: College Level Teaching; Dissertation Topic: Field Theory.

ROBERT WILLIAM THOMPSON. Worcester State College, B.S. Ed., Clark University, M.A.; Urban Geography; Career Objective: College Level Teaching.

ROBERT S. WEINER. University of Pittsburgh, B.S., M.A.; Urban Political Geography; Career Objective; College Level Teaching and Research; Dissertation Title: "The Impact of a Changing Jurisdictional Pattern upon the Urban Landscape."

EXPERIENCED TEACHER FELLOWSHIP PROGRAM FELLOWS

THOMAS CHARLES EDEN. Boston College, B.S. Ed.

DONALD J. FANCY. Worcester State College, B.S., M.Ed.

THOMAS JOSEPH LEFAVE. Worcester State College, B.S.

ROBERT CHARLES MULCAHY. Providence College, A.B.; M.Ed., Rhode Island College.

JAMES ANDREW ROBINSON. Worcester State College, B.S. Ed., M.S. Ed.

IRVING SCHEIN. University of Connecticut, B.A., B.S.

IRVING ARTHUR SCHWARTZ. Boston University, B.A., M.A.

GEOFFREY BURR STEARNS. Colgate, B.A.; Harvard University, M.A.T.

GEORGE ARGUNAL TAYLOR. Alabama State, B.S.; North Adams State College, M.S.

DAVID C. TILTON. University of Vermont, B.A., M.A.

As a part of a continuing effort into the problems of effective communication through the use of maps, the course in map design during the fall semester found seven students involved in programs of psychophysical research. The principles and methods of experimental psychophysics can be applied to maps, and thus the cartographer is able to "test" the efficiency of his presentation. These efforts were organized, first, to introduce the student to the basic aspects of psychophysical testing, and, second, to fill a gap or two in our understanding of various map reading problems. Four papers dealt with point symbols. Two students, Joseph Poracksy and Raymond T. Yarnall, dealt with legend design for maps using graduated circles. Ali A. Pourabbas examined the differences in size estimation of rectangles of different shapes. Kang-tsung Chang, using circles and squares as stimuli in the testing situation, examined problems in the use of the various parameters in the psychophysical equations. Lewis D. Rosenthal attempted to establish the relationship between the gray scale and its color associations. Alan F. Smith attempted to determine those points on the border of Massachusetts where "information" is concentrated, in order to ascertain which points are critical for shape identification and thus should be included on a highly generalized representation of the state. The work of Borden D. Dent on the problem of texture and the figure-ground relationship is reported elsewhere in this volume.

FACULTY NEWS

SAUL B. COHEN

Dr. Cohen's activities for the past academic year involved a variety of enterprises connected both with the School of Geography, the Graduate School and outside educational responsibilities. Part of the summer was taken up with a trip to Hawaii for a conference dealing with the general problem of educational innovation. Then came a brief vacation with his wife and two daughters on the Cape Breton Islands. In September his responsibilities as Dean of the Graduate School were assumed, as well as the task of pursuing the development of the School of Geography with the assistance of the National Science Program Departmental Development grant that was awarded in June, 1967. Major professional responsibilities for the year included chairmanship of the National Academy of Science-National Research Council Committee on Geography, and serving as vice-chairman of COMPASS (The Consortium of Professional Organizations for the Study of Special Teaching Improvement Programs). Meetings with these committees, as well as with the National Institute for the Training of Teachers of the Disadvantaged, the American Association of Geographers Council and National Science Foundation programs, involved trips to Washington, New York and Chicago. Visits were made to Florida, Texas, California, Colorado, and Arizona. In January, a visit was made to Rio de Janiero in connection with planning for a Clark Summer 1968 NDEA Institute. Dr. Cohen's outside lectures included appearances at the U.S. Naval War College, the American War College, and the American Association of Colleges for Teacher Education. Geography Departments visited included Kent State, the University of Chicago, and North Carolina College at Durham. In the spring, his appointment to a National Advisory Committee on the Training of Teachers of Teachers initiated a series of visits to a number of universities concerned with this problem.

Problems and Trends in American Geography, which was edited by Dr. Cohen, appeared in January; also published was an article on "The Contemporary Geopolitical Setting: A Proposal for Global Geopolitical Equilibrium" in Essays in Political Geography, edited by Charles Fisher, Methuen, 1967.

Research in Political Geography was slowed by the burdens of two administrative positions at the university. However, work continues on a new text, with emphasis upon national perception and political systems.

RAYMOND E. MURPHY

Dr. Murphy's manual, Exercises in Urban Geography, designed particularly to be used with The American City: An Urban Geography, is to be published by McGraw-Hill this year.

On July 8 and 9, he will take part in the urban geography sessions of an Institute for Advanced Geography (NDEA) being held at the University of Oklahoma, Norman, Oklahoma. His part will consist of informal discussions and two lectures.

Officially, he will retire at the end of the present school year, but has agreed to continue editing Economic Geography until a successor is found.

He is attempting to make the July issue of the journal a special IGU issue, concentrating particularly on India and Pakistan. Present plans call for making extra copies of the issue available for free distribution at the November meeting of the IGU in New Delhi.

HENRY J. WARMAN

Dr. Warman spent last summer at two institutes, the first in Bakersfield, California, at Fresno State College, and the second at Michigan State University, where he plans to return this coming summer. In addition, he taught geography at the first summer session at the University of Colorado.

During the past academic year, he acted as a consultant to Grolier Society Incorporated and to local (Sturbridge and Newton) school systems in curriculum development and revision.

Among his publications, he reports sets of transparencies on the World, North America, and South America, and a set of three books in the series, "Living in Our Times." His articles have been "Geography in the Curriculum," in Educational Forum, and "The Increasing Significance of Relative Location," in Journal of Geography.

He plans to attend the International Geographical Union session of the Commission on Teaching, in Madras, India, in December, along with the I.G.U. sessions in New Delhi.

RODMAN E. SNEAD

During the fall of 1967, Dr. Snead was a visiting professor at the University of New Mexico in Albuquerque. In the Spring of 1968 he returned to Clark to teach three courses: Principles of Geomorphology, a regional course on South Asia, and a Seminar on Coastal Geomorphology.

During the Spring, he worked on several research papers dealing with the West Pakistan coast plus preparation of an Atlas of Land Features to be published by John Wiley and Sons, 1969. Preparation was also made for field work along the south coast of Iran from July 1968 through January 1969. The trip to Iran, planned for the fall of 1967, had to be postponed one year.

A publication in 1967 was "Recent Morphological Changes Along the Coast of West Pakistan," Annals of the A.A.G., Vol. 57, No. 3, September, 1967. In press is "Weather Patterns in Southern West Pakistan," Archiv. fur Meteorolgie, Geophysik und Biolatimatologie, 1968, and also a book with Ian Burton and Robert Kates on Coastal Flood Hazard in Human Ecology to be published by the University of Chicago Press this year.

He has accepted a permanent position as Professor of Geography at the University of New Mexico to be effective in February, 1969.

JEREMY ANDERSON

Summer, 1967, was divided between conducting a summer institute in Geographic Investigation and Analysis for nine undergraduates from small southern colleges, and travel (California, Northern Sierra, Washington State). While in Seattle, Dr. Anderson attended a conference on The Agrarian Problem in Light of Communist and Non-Communist Experience, at the University of Washington.

The fall witnessed publication of "Fodder and Livestock Production in the Ukraine: A Case Study of Society Agricultural Policy," in the East Lakes Geographer, Vol. 3, October, 1967; initiation of research on the reconstruction of the 19th century arricultural land use in the Worcester area in conjunction with the field course; and a guest lecture at the University of Kansas.

The January study period was devoted to a very successful three-week field camp in Barranquitas, Puerto Rico, for 22 first-year graduate students and experienced teacher fellows. Located in the Cordillera Central, Barranquitas proved an ideal location for carrying out a wide variety of investigations in agricultural, urban, and physical geography. The lure of Latin America is growing with exposure. Spring vacation was devoted to conducting a study of urban morphology and urban imagery with graduate students Denis Wood and Ingrid Hansen in San Cristobal las Casas, Chiapas, Mexico.

JAMES M. BLAUT

Dr. Blaut has been "commuting, as usual," to Puerto Rico--and this summer will go on to Venezuela and Brazil, in his "Sopwith Camel." He has planned institute teaching in San Juan and Rio de Janeiro for the summer, followed by some field work in the Venezuelan Guayana. He is, meanwhile, continuing research on environmental perception in children, with his wife Meca and Professor George F. McCleary, Jr.; a major project in this area is now under way and one paper, "Environmental Mapping in Young Children," has been completed.

MARTYN J. BOWDEN

Dr. Bowden completed his Ph.D. dissertation, The Dynamics of City Growth: An Historical Geography of the San Francisco Central District 1850-1931, in September and received his degree in December, 1967. His introductory course, Approaches to Geography, was a "full house," and nine members of the class were taken to St. Croix, V.I., for three weeks of field work in January. A report, "Rainfall and Island's Growth," will publish some of the results. A monograph arising from the previous Independent Study Project (1967)--"Expressway and the Town"--is in press. He led a seminar on the Dynamics of Central District Growth at the University of Toronto, and presented a paper, "The Perception of the Great American Desert," to the Historical Geography Special Interest Group of the New England Geographers. His big news is the birth of his second son, Jonathan Edward.

WILLIAM A. KOELSCH

Dr. Koelsch rejoined the staff in September as Assistant Professor of History and

Geography. In addition to teaching courses in American intellectual history and historical geography, he has served temporarily this year as administrative director of the Experienced Teacher Fellowship Program in history and geography. He has completed two scholarly articles this spring, one on the historical geography of Harlan H. Barrows and the other on Buchanan's land policies, as well as a popular article on Freud's 1909 visit to Clark.

Dr. Koelsch is currently engaged in research for a book on American geography in the 19th century and in planning for new graduate and undergraduate programs at Clark. This summer will be spent in research, limited participation in the summer program for experienced teacher Fellows, and travel to certain historic sites in the South Atlantic states.

DAVID SHARON

Dr. Sharon joined the staff as visiting associate professor for 1967-68. He is permanently on the staff of the Geography Department, Hebrew University of Jerusalem, Israel, where he earned his degrees (M. Sc. 1960, Ph.D. 1964). In 1966 he was awarded a research associateship for 1966-67 by NAS-NRC. He worked in research on statistical models in climatology in the U.S. Army lab in Natick and on meteorological instrumentation in the Department of Meteorology at M.I.T.

This year, he has taught courses in climatology and quantitative methods and carried on research in Natick with the cooperation of graduate students Harry McPhilimy and Karl Chang of Clark, as well as Professor Joseph Sage of W.P.I.

Last September he attended a seminar on Markov chains in Meteorology held in the Air Force Cambridge Research Labs in Bedford, Mass. During the second semester he taught a methodological course in the Department of Geography at Boston University and in May he will present a paper on the production of temperature-durations at the American Meteorological Society conference on agricultural meteorology in Ottawa, Canada.

He expects to return to Israel this summer.

J. RICHARD PEET

Mr. Peet joined the faculty in September, having come from the Graduate School at Berkeley, and has spent all his free time this year completing his Ph.D. dissertation on the spatial expansion of agriculture in 19th century America. He contributed a brief article, "The Present Pertinence of Von Thunen Theory" to the Annals Commentary, A.A.A.G., Vol. 57, No. 4 (December, 1967), pp. 810-811.

DAVID STEA

Dr. Stea assumed a joint appointment to the Psychology and Geography departments last fall and is a Fellow with the Heinz Werner Institute here, as well as being a research affiliate at M.I.T. He is living in Boston's Back Bay.

During the past year, Dr. Stea delivered five guest lectures at six other universities and submitted articles to Landscape, Journal of the American Institute of Architects, and The Revisde de la Sociedad Interamericana de Planezcion. His research on Mexican urban imagery recommenced on April 4, supplemented by other studies of psychological characteristics of physical form.

GEORGE F. McCLEARY, JR.

After participation in two summer institutes and a two-month stay in Wisconsin (working on the unfinished dissertation), Mr. McCleary introduced course work both in various technical aspects of map production and in map design (reported on elsewhere in this volume). Attention was devoted also to the map collection, where a corps of students began a large-scale program to reorganize and recatalogue the holdings, as well as to the production of maps and graphs for books, theses, and articles. The most ambitious effort undertaken was the preparation of maps and address coding forms for the 1970 census.

"Spare time" ventures saw attendance at several cartographic meetings, planning for the new space which will be developed in the old library, the initiation of an information storage and retrieval system (see the note elsewhere in this volume), and an occasional minute devoted to the problems of dasymetric mapping.

On the home front, John B., his second son, joined the family.

RICHARD A. HOWARD

Mr. Howard is instructor of computer programming at Clark University and Worcester Junior College while pursuing a Ph.D. program in resources planning at the University of Massachusetts in Amherst.

His current publications are: "A Computer Model for Cambial Activity," with B. F. Wilson, Forest Science, Vol. 14, No. 1, March, 1968; "Storing and Retrieving Library Information (Search)," with H. R. Lent, U.S.D.A. Bulletin, 1967; and "Systems Analysis in Forest Resource Planning," Newsletter, New England Section, Society of American Foresters, February, 1968.

The Graduate School of Geography and the Department of History, Government and International Relations at Clark sponsored a thirteen-month joint program for 20 experienced teacher Fellows in 1967-68; Clark has been awarded 25 additional fellowships to continue this program in 1968-69. The program attempts to provide for each teacher (a) additional subject-matter competence in his own discipline and some competence in the other discipline; (b) an appreciation of the methodologies appropriate to each discipline and the ways in which they might be interrelated; and (c) an opportunity for the development of new materials, preferably with a cross-disciplinary focus. Certain "core" courses in methodology, techniques, and curriculum were designated or designed for Fellows, but unlike the usual "teacher's institute," the larger part of the program was left elective, with each Fellow relatively free to pursue his own academic interests. The total program of two summers and one academic year culminates in an independent curriculum workshop in which Fellows design new instructional materials to meet their own needs.

Most of the teachers have masters' degrees and several years of teaching experience. This year most participants were drawn from Connecticut and Massachusetts; next year they will be drawn from other New England states as well. Alan Baddeley (M.A. Cambridge University in Geography), Her Majesty's Inspector of Schools in Bristol, England, was brought over last fall for several weeks in a highly successful attempt to acquaint Fellows with the teaching of Geography and History in Great Britain. Dr. Cohen (Geography) and Dr. Gerald Grob (History) were Co-directors of the project; Dr. Koelsch (History and Geography) served as administrative director and counselor to Fellows. In September, Dr. Richard Ford (History), now associated with the Fenton project in social studies education at Carnegie-Mellon University, will join the Clark faculty with administrative responsibility for this program and for the development of a program to improve the preparation of college teachers in Geography, History, and Economics.

This is a story which Dr. Van told in a seminar recently; it concerns environmental determinism and an aborted attack made upon it.

During the nineteen-thirties, the general movement in the United States had been against determinism as expressed by Ellsworth Huntington and Ellen Churchill Semple. Clark University was regarded as the last bulwark to be stormed. The moment for the final attack came soon after the Second World War at a meeting of the Association of American Geographers held during the Christmas period in Charlottesville, Virginia, in 1947. The attack was in the form of a paper to be presented by Robert S. Platt which was to show once and for all that man had conquered his environment. The title of the paper was, "Can We Avoid Determinism". The moment for the delivery of the paper arrived--but no Platt; he had been delayed by a violent snowstorm in New York which had blocked all traffic.

The computer serves in many capacities. Among the ventures undertaken during the past year was an effort to develop its use both as a storage system for bibliographic information and as a printing press. As a dividend to this work, it also served as an aid in the classroom. The program undertaken made use of the Data Information Storage and Retrieval Program developed by Richard Howard. The bibliographic information involved is a series of references in the literature of the field of cartography, particularly references pertaining to the history of cartography and mapping. Students in the Map Appreciation and Reading course, under the direction of Professor McCleary, gathered the references and wrote them on coding forms; the citations were then punched on cards. These references were then processed by the IBM 360/40 system at the Worcester Area College Computation Center, with the print-out made directly onto spirit masters. The masters were then duplicated and the students provided with an 84-page bibliography to be used in the preparation of their term paper. The existing series of references has been extended, and will eventually provide a collection of works in all aspects of cartography. The system is a flexible one, and it allows one to search the series of citations, printing only those covering particular topics or particular authors. Plans have been made to continue the program, both to serve as an aid in research and to provide students with source lists for class and seminar use.

ALUMNI NEWS

AGNES MORGAN ALLEN (M.A. 1934; Ph.D. Clark 1937) has retired as Dean of the College of Arts and Sciences at Northern Arizona University. She is now devoting full time to teaching geography. Her department has just begun a major in geography and plans soon to develop a graduate program.

ROBERT H. ARNOLD (M.A. Clark 1964) is Assistant Professor of Geography at Illinois State University in Normal. He has completed the field investigation for his doctoral dissertation on Commercial Recreation in the Urban Environment and hopes to finish writing it during this school year. He married Lynn Waters of Greenville, South Carolina, on June 13, 1967, and honeymooned in Charleston, S.C.

JOHN AUGELLI (B.A. Clark 1943) is Professor of Geography and Director, Center of Latin American Studies, the University of Kansas at Lawrence. On November 29, 1967, he was appointed by President Johnson to a three-year term on the Board of Foreign Scholarships.

HLA TUN AUNG (M.A. 1964) is Assistant Lecturer in the Department of Geography, Arts and Science University, Rangoon, Burma. In March 1967, he presented a paper on "Observation on Crop Diversification of Burma" at the Earth Science Division of the Second Burma Research Congress.

NICHOLAS BARISS (Ph.D. Clark 1967) is Assistant Professor of Geography at the University of Omaha. During the 1967 summer he studied valley profiles in loessic and non-loessic sediments in western Nebraska.

GEORGE A. BEISHLAG (M.A. Clark 1937) is Professor of Geography at Towson Stage College in Baltimore. He visited Expo '67 in Montreal and continued on to visit Labrador.

MILDRED BERMAN (M.A. 1959; Ph.D. Clark 1963) is Associate Professor of Geography at Boston University. She published "Social Change among the Beersheba Bedouin" in Human Organization, Spring/Summer issue, 1967. She traveled to the Caribbean and south coast of South America in January 1968 and completed research for a paper called "Settlement Classification Problems of Maya Settlements."

MALCOLM H. BISSELL (post-doctoral fellow, 1927-28) reports that he and his wife spent a month last winter in Hawaii, Tahiti, and New Caledonia.

CLYDE J. BOLLINGER (Clark 1929-1930) is Associate Professor of Geography Emeritus at the University of Oklahoma, in Norman. His newest paper, "Sun Tides, and Unexplored Astronomic Approach to Climate, Cycles and Trends," will be published in the Swedish journal Tellus.

LEONARD W. BOWDEN (Ph.D. Clark 1964) is Associate Professor of Geography at the University of California, Riverside. Recent publications include: "Remote Sensing of the World's Arid Lands," I.G.U./U.N.E.S.C.O. Symposium, Lima, Peru, and "Remote Sensing of Southern California," technical report, U.S. G.S. He is now the principal investigator for the U.S.G.S./N.A.S.A. research contract on "Remote Sensing of Southern California and Related Environments."

DONALD G. BRANDON (Clark 1946-1947) is Acting Chairman of the Department of Geography at Morgan State College, Baltimore. He traveled this year to the Hawaiian Islands and to California to study the Watts Area. He is a member of the Research and Bibliography Committee of the Association of Social Science Teachers.

ROGER J.E. BROWN (Ph.D. Clark 1961) is Associate Research Officer for the Division of Building Research of the Canadian National Research Council in Ottawa, Ontario. He made a two-month visit to the U.S.S.R. in 1966, spending five weeks in Eastern Siberia studying permafrost features and construction activities. In Canada he is continuing his research on permafrost distribution.

HARRY H. CALDWELL (B.A. 1941; Ph.D. Clark 1951) is Professor of Geography and Chairman of the Department at the University of Idaho, Moscow. He took a sabbatical leave in Asia during 1966-67 and was engaged in a study of coal in Turkey, copper development in Rajesthan, and logistics for Stanford Research Institute in Thailand. He met Clark alumni while lecturing at the University of Indonesia, in Sabab, and had lunch in Banghok with Helen Smith and Sam Dastriel.

NORMAL CARLS (A.M. 1934; Ph.D. Clark 1935) is Professor of Geography and Chairman of the Department at Shippensburg State College in Pennsylvania. He published the final book of the Knowing our Neighbors series, a grade 4-7 social studies series, as senior author and general editor in 1968.

ALBERT S. CARLSON (A.B. Clark 1929; M.A. 1931; Ph.D. 1939) is Professor of Geography at Dartmouth College, Hanover, N.H.

THOMAS W. CHAMBERLIN (M.A. 1937; Ph.D. Clark 1946) is Academic Dean and Professor at the University of Minnesota, Duluth. He was very active this past year in community affairs, being in several state and local civic organizations.

JEN HU CHANG (Ph.D. Clark 1954) is Associate Professor at the University of Hawaii. In January 1968 his book Climate and Agriculture was published by Aldine Publishing Company.

EUGENE S.T. CHIN (B.A. 1954; M.A. Clark 1956) is the Senior City Planner of the Dept. of Developing and Planning for Chicago. He married in Chicago in July 1965 and in December 1967 is taking a six-week tour of the Far East. His wife Nancy is from Hong Kong.

CATHERINE ELIZABETH COX (A.M. Clark 1942) is Assistant Professor of Geography at the State College, Fitchburg, Mass. During the summer of 1967 she made an extensive tour through the St. Lawrence and Saguenay Valleys and the Maritimes. In December 1968 she plans to attend the International Geographic Congress in New Delhi.

CLARK N. CRAIN (Ph.D. Clark 1952) is Professor of Geography & Regional Development at the University of Denver. Dr. Crain is Chief Consultant to the Upper Indus Basin Regional Plan, West Pakistan, which has necessitated several trips to West Pakistan and the Middle East. He has also presented papers on development in new countries.

HAROLD F. CREVELING (Ph.D. Clark 1951) is Head of the Geography Department at East Stroudsburg, Pa., State College. Dr. Creveling was on sabbatical during the spring semester of 1967, and travelled through the Mediterranean into the Middle East and Central and Western Europe.

JAMES I. CULBERT (M.A. 1938; Ph.D. 1939 Clark) is Head of the Department of Earth Sciences and Astronomy at New Mexico State University. Dr. Culbert has been busy planning a new observatory for his department and after its completion this summer plans to retire and move back to Taos.

RICHARD L. DAY (A.B. 1948; M.A. 1950 Clark) is Associate Professor of Geography at the University of Idaho. He has been busy in research of microclimatic patterns in the Clearwater Mts. of northern Idaho, a project sponsored by the Water Resources Research Institute of the University of Idaho.

NADINE A.H. DEACON (ABD Clark 1945) is Head of the Geography Department at the Bishop Strachan School for Girls in Toronto. Mrs. Deacon has recently spent two months in the Middle East and Greece, and in 1968 plans to travel to France and Spain.

VEVA K. DEAN (M.A. 1940; Ph.D. Clark 1949) is Professor of Geography at the State College at Fitchburg, Mass.

AUBREY DIEM (M.A. Clark 1956) is Professor of Geography at the University of Waterloo. In the summer of 1967 he led a field trip to England and eastern Europe and has published the following: "Urban Development Problems of the Ports of Rotterdam and Amsterdam," in Cahiers de Géographie de Québec (April 1967) and "Canada of Expo," in New Society (May 1967).

SIGISMOND DE R. DIETTRICH (Ph.D. Clark 1931) is Professor and Chairman of the Department of Geography at the Inter-American University of Puerto Rico. Dr. Diettrich has currently been working on population problems of Puerto Rico.

JOHN E. DORNBACH (Ph.D. Clark 1967) is Chief of the Mapping Science Branch, Lunar and Earth Sciences Division, Manned Spacecraft Center, NASA, Houston. Dr. Dornbach has been engaged in establishing an Earth Resources Program for gathering remote sensor data from aircraft and spacecraft.

JOHN R. DUNKLE (Ph.D. Clark 1955) is Assistant Dean and Professor of Physical Sciences and Geography at the University of Florida in Gainesville. Dr. Dunkle is kept busy in his administrative duties, teaching cartography, doing research on the historical geography of St. Augustine, and acting as a consultant for the National Park Service.

VAN H. ENGLISH (Ph.D. Clark 1942) is Professor of Geography at Dartmouth College.

BART J. EPSTEIN (Ph.D. Clark 1956) is Manager of Retail Real Estate for B.F. Goodrich in Akron, and is a member of the graduate faculty of Kent State University where he teaches part time.

RICHARD B. ERICKSON (A.B. 1954; M.A. Clark 1959) is Executive Director of the Southeastern Connecticut Regional Planning Agency. He is chairman of a technical panel for the U.S.D.A. Resource Conservation & Development Project for eastern Connecticut. Mr. Erickson has also recently been appointed by Gov. Dempsey to the Conn. Air Pollution Commission.

WILMA B. FAIRCHILD (M.A. Clark 1937) is editor of the Geographical Review for the American Geographical Society, a position which would keep anyone busy.

CHARLES N. FORWARD (Ph.D. Clark 1958) is Associate Professor in the Department of Geography at the University of Victoria, Victoria, B.C. Dr. Forward recently received a Canada Council research grant to study Australian Ports which he will do during the 1967-68 academic year while on sabbatical leave.

EDWIN J. FOSCUE (Ph.D. Clark 1931) is Professor Emeritus of Geography at Southern Methodist University. Dr. & Mrs. Foscue have recently returned from an extended trip to the South Pacific and New Zealand.

J. KEITH FRASER (Ph.D. Clark 1964) is Executive Secty. of the Canadian Permanent Committee on Geographical Names and is Acting Director of the Geographical Branch of the Department of Energy, Mines and Resources, Ottawa. Dr. Fraser published "The Rational Approach to Geographical Names in Canada," in Cahiers de Géographie de Québec (1966) and was a Canadian delegate to the U.N. Conference on the Standardization of Geographical Names in Geneva, in September 1967.

ROLAND J. FUCHS (M.A. 1957; Ph.D. Clark 1959) is Associate Professor and Chairman of the Department of Geography at the University of Hawaii. Dr. Fuchs spent the last half of 1966 as a Fulbright Research Scholar in Nepal. He has recently resigned as Associate Dean of the College of Arts and Sciences in order to devote full time to his department.

ALEXANDER R. GASSAWAY (Clark 1957-58) is Assistant Professor of Geography at Portland State College in Portland, Oregon. He published "A Field Method: Estimating the Total Size of Reindeer Herds in Northernmost Norway," The Newsletter of the Association of Pacific Coast Geographers (Spring 1967) and has had accepted for publication "The Dynamics of Agricultural Product Marketing in Finnmark Province, Northernmost Norway," in the Ad Novas series of the University of Olso Press.

JOHN L. GEORGE (M.A. Clark 1956) is Associate Professor of Geography at State College in Salem, Mass. He has been working on his dissertation from Boston University and has recently published an article entitled, "Impact of Highway Connection Improvements," in the Danvers Historical Collections (1967).

PETER G. GOHEEN (M.A. Clark 1964) is Assistant Professor of Geography at the University of British Columbia.

LOREN GOULD (A.B. 1953; A.M. Clark 1959) is the Assistant Dean of Men at the State College of Worcester, Worcester, Mass. He is kept busy with his administrative duties and "teaching one course a semester--a small class of only 130 sophomores."

ANDREAS GROTEWOLD (M.A. Clark 1951) is Professor of Geography at the University of Missouri. He taught summer school at the University of Nebraska and has recently travelled to the Mezzogiorno. In January 1967, Prof. Grotewold published two articles: "World Exports of Non-Mineral Primary Products, III - Commodity Specialization," in the American Journal of Economics and Sociology, and "The Effect of Import Restrictions on Land Use: The United Kingdom Compared with West Germany," in Economic Geography.

EDNA M. GUEFFROY (M.A. Clark 1927) is Professor Emerita of Geography at Illinois State University in Normal, Ill.

WILLIAM F. HARE, JR. (A.B. 1951; A.M. Clark 1954) is the General Manager of Area Development for the Worcester Area Chamber of Commerce. He published a paper in the American Industrial Development Council Journal, Vol. III, No. 1, January 1968, entitled, "Industrial Development: Opportunities, Requirements and Available Academic Training."

ALAN HARRIS (Clark 1951-52) is Senior Lecturer in Geography at the University of Hull, Yorkshire, England. He is continuing his work on the historical geography of northern England and has published several papers on the subject in the past year.

ANDREW HASTINGS (Ph.D. residence at Clark Clark, fall semester 1967) is a Physical Geographer for the Earth Sciences Laboratory of the U.S. Army Natick Laboratories in Natick, Mass. He was elected Vice-Chairman of the Natick Conservation Commission and is currently working on his dissertation. His most recent publication is a paper on "Military Geography," U.S. Army R & D Newsmagazine (April 1966).

SISTER MARY URSULA HAUK, R.S.M. (Ph.D. Clark 1958) is President of Mount Aloysius Junior College in Cresson, Pa. She is currently editing Book 6 of the Geography Gateway series by Allyn & Bacon; workbooks 4 and 5 were published in January 1968.

DOROTHEA BURTON HAWLEY (M.A. 1947; Ph.D. Clark 1949) is a Branch Chief for the Defense Intelligence Agency in Washington, D.C.

RICHARD D. HECOCK (Ph.D. Clark 1966) is Assistant Professor of Geography at Eastern Michigan University and is Assistant Project Director of the Commission on College Geography (A.A.G.). Dr. Hecock's major accomplishment was marrying Miss Georgia Ingalls ("a non-geographer"), and some of his minor accomplishments have been: directing a summer field trip to Europe; chairing the Midwest Salary Conference; presenting papers at the East Lakes Division of the A.A.G., the Midwest Conservation Education Conference, and the Mich. Science Teachers Association; and he is currently working with John Rooney, Jr. (Ph.D. Clark 1966) on consumer expenditure patterns in urban areas of the United States, using multi-variate analysis.

FRANK HELLARD (M.A. Clark 1954) is Assistant Professor in the Science Department at Montclair State College and he also teaches cartography at Rutgers University.

MARILYN (MRS. FRANK) HELLARD (M.A. Clark 1954) is Associate Professor in the Social Science Department at Newark State College. The Hellards took a camping trip to California in the past summer. The second edition of their workbook, Exercises in Physical Geography and their map outline series were published this year by the William Brown Book Company.

GERRY HONES (M.A. Clark 1953) is Lecturer in Education in the School of Education at Bath University of Technology in Bath, Somerset, England. In September 1967 he assumed a new post of "teacher-training" postgraduates in Geography.

GEORGE M. HOWE (Ph.D. Clark 1956) is Director, Meteorological Services (Travelers Weather Service) and Regional Analysis Divisions. In December 1967 he married Janet Nipper and is currently completing a Natick Lab.-sponsored research grant on identifying and mapping arid and semi-arid lands.

JOSEPH B. HOYT (Ph.D. Clark 1954) is Professor of Geography and Chairman of the Social Science Division at Southern Connecticut State College in New Haven. Dr. Hoyt is now working on a cultural geography text/monograph on man's alterations of his physical environment, and is also writing on teaching aids for introductory geography courses.

BERT HUDGINS (Ph.D. Clark 1930) is Professor Emeritus of Geography at Wayne State University in Detroit. Dr. Hudgins keeps himself busy by traveling with his wife, reading, and spending time with his grandchildren.

PAUL HUFFINGTON (A.M. Clark 1929) is Professor Emeritus of the State College at Bridgewater, Mass. He has let the Massachusetts climate "influence" him and his wife to move to Florida.

ESTHER KINCH HUNTER (M.A. Clark 1949) is busy as a homemaker with five children, and "crewing" for her husband, who is a sailplane pilot, which takes them all over the country in various national and regional competitions.

HARRY K. HUTTER (M.A. Clark 1930) retired in June of 1967 after teaching for 19 years at the University of Toledo in the field of Geography. Professor Hutter's wife recently passed away and the Monadnock staff extends their deepest sympathy.

ALBERT H. JACKMAN (Ph.D. Clark 1953) is Head of the Department of Geography, Western Michigan University. In August 1967 Dr. Jackman was guest of the Arctic Institute of North America at their Icefield Ranges Research Project in the Yukon.

PRESTON E. JAMES (Ph.D. Clark 1923) is Maxwell Professor of Geography at Syracuse University. Dr. James, always busy with Association affairs, took time out in May 1967 to receive an honorary Doctor of Science at Eastern Michigan University.

JESSIE THORNTON JESSEMAN (M.A. Clark 1941) is now retired, but is a very active alumna who attended the first meeting of the New Hampshire Alumni held in November 1967, and she also attended the Clark Alumni meeting this year in Miami.

LANE L. JOHNSON (M.A. 1954; Ph.D. Clark 1960) is Associate Professor at Wayne State University. His current research includes work on central places and recent trends in American geographic research.

JAMES P. JONES (M.A. Clark 1951) is Chairman of the Department of Geography-Geology at the State College at Boston, Mass. Dr. Jones has been busy filming TV series on: The Metropolitan Environment (Spring 1967) and Man's Changing World (Fall 1967). He has also written a Pilot Workshop in Urban Studies (NDEA) and Secondary School Needs for the Town of Braintree, Massachusetts.

HARRY B. KIRCHER (Ph.D. Clark 1961) is Associate Professor, Earth Science faculty, Social Science Division, at Southern Illinois University in Edwardsville. He published "The Southern Illinois Prairies" in Geography through Maps, Special Publication No. 11 of the N.C.G.E. He was Co-Chairman and Treasurer for the 1967 A.A.G. annual meeting, Regional Co-ordinator of the A.A.G. '67-'68 Visiting Scientist Program, and Vice-President, Illinois Geographical Society, '67-'68, and Chairman of the '68 Spring meeting.

ESTHER L. KISTLER (M.A. Clark 1938) has been retired from teaching since 1959. She spent part of last year in Florida and part in Arizona, and expects to spend this winter in Sarasota, Florida.

WILLIAM A. KOELSCH (A.M. Clark 1959) is Assistant Professor of Geography and History at Clark University. Aside from keeping busy as a professor, Dr. Koelsch is currently researching toward a book on nineteenth-century American Geography.

MARY MACDONALD (MRS. FRED S.) KRAMER (M.A. Clark 1941) is a teacher in Dallas. This summer the Kramers vacationed in the southwest and in December they went to Oaxaca, Mexico, where they visited the ruins of Monte Alban and Mitla.

FRANCES M. LATHROPE (M.A. Clark 1940) is a retired Lt. Colonel in the U.S. Army. She has now retired from teaching elementary school after nine years since her military retirement. Her recent travel includes the Scandinavian countries, the Caribbean, and South America.

MINNIE E. LEMAIRE (M.A. 1932; Ph.D. Clark 1935) is Chairman of the Department of Geology and Geography at Mount Holyoke College. She recently published a paper in the Journal of Geography, LXVI, 7, 1967, entitled, "Agriculture in West Africa." She served on the executive board of N.C.G.E. and is on the A.A.U.W. Standards in Higher Education Committee.

TREVOR LLOYD (Ph.D. Clark 1940) is Professor of Human Geography at McGill University.

RICHARD F. LOGAN (B.A. 1936; M.A.Clark 1937) is Professor of Geography at the University of California, Los Angeles. This year he is teaching courses at U.C.L.A., Santa Monica City College and at the University Extension at Pasadena.

ROBERT LOOKER (A.M. Clark 1960) is principal planner for the City of Hartford, Conn.

ALETA (MRS. ROBERT) LOOKER (A.M. Clark 1960) is Assistant Instructor in Geography at Southern Connecticut State College.

ARTHUR C. LORD (A.M. Clark 1959) is Assistant Professor of Geography at Millersville State College in Pennsylvania.

SUSAN SPRAGUE (MRS. HENRY) MCCUTCHEON (Clark 1964-65) is a fourth-grade teacher in the West Boylston school system.

GRACE LEE (MRS. ROBERT P.) MCINTOSH (B.Ed. Clark 1929) is a housewife, mother and grandmother living in Rome, N.Y.

EMMANUEL MAIER (Ph.D. Clark 1961) is Chairman of Earth Sciences and Geography at Mass. State College at Bridgewater. He returned to Clark for the Summer Institute for Teachers of Political Geography in 1967. He has toured Europe and Iceland and recommends a future Clark field camp in Iceland.

RONALD MCCALL (M.A. 1963) is Assistant Professor of Geography at Shippensburg State College, Shippensburg, Pa. He reports that he is a cooperative weather observer for the U.S. Weather Bureau in Shippensburg and that he has co-authored with W.R. Shirk a book entitled, The Geology and Geography of South Mountain.

WALLACE E. MCINTYRE (M.A. 1947; Ph.D. Clark 1951) works for the U.S. government. During March and April 1967 he toured the Near East.

ALBERT R. MITCHELL (M.A. Clark 1960) is Associate Professor of Geography at Farmington State College in Maine. He published "The Rural-Urban Dichotomy: A Problem for Teachers" in the Journal of Geography in February 1967.

LOUISE (MRS. ALBERT R.) MITCHELL (B.A. Clark 1960) is a housewife. The Mitchells now have three children.

PAUL CROSS MORRISON (Ph.D. Clark 1941) is Professor of Geography at Michigan State University in East Lansing. He will direct his fourth N.D.E.A. Summer Institute in General Geography this summer.

WALTER K. MORRISON (M.A. Clark 1952) is an Instructor in Cartography for the Nova Scotia Land Survey Institute.

BENJAMIN MOULTON (A.B. Clark 1939) is Professor of Geography and Chairman of the Department of Geography and Geology at Indiana State University, Terre Haute. With his staff he developed a program of graduate work, moved into new quarters, and visited six other doctoral-offering geography departments. This summer he is taking students to Alaska to compare data collected ten years ago when Alaska was voted statehood.

JOHN M. MOULTON is Professor of Geography and Geology at Hastings College. He spent the summer of 1967 working in the field gathering data for his dissertation.

RICHARD E. MURPHY (Ph.D. Clark 1957) is Professor and Chairman of the Department of Geography at the University of New Mexico. His newest publication, Map Supplement No. 9, in Annals of the A.A.G., "Landforms of the World," is in final proof and will appear with the March 1968 issue.

SALVATORE J. NATOLI (M.A. 1957; Ph.D. Clark 1967) is Chief of the Geography Section and Acting Chief of the Economics Section of the Social Sciences Branch, Division of Educational Personnel Training in the U.S. Office of Education. He presented a paper, "Effects of Zoning on the Development of Urban Land Use Patterns" to AAG meetings in St.Louis in April. He co-edited the May issue of Journal of Geography. During January of this year, Dr. Natoli delivered lectures at Ohio University and Southern Illinois University and will publish this year a 7th-grade text, Gateways to the Americas.

HERMAN L. NELSON (Ph.D. Clark 1954) is Professor of Geography at the University of Northern Iowa. He recently published A Geography of Iowa, a text to be used in upper elementary and junior high grades.

NORTON NICHOLS, JR. (A.M. Clark 1959) is Assistant Superintendent-Educational Services Antelope Valley Union High School District, Lancaster, California.

G. ETZEL PEARCY (M.A. 1932; Ph.D. Clark 1940) is the Geographer for the U.S. State Department. He has completed Handbook of New States, with Dr. E.A. Stoneman as co-author, and is the senior editor for the Searchlight Series of Geographies, of which 36 volumes have now been published. Dr. Pearcy was Vice-Chairman of the U.S. delegation to the 5th U.N. Cartographic Conference for Asia and the Far East in March at Canberra and held the same title with the U.S. delegation to the U.N. International Conference on the Standardization of Geographic Names in September at Geneva.

ROBERT F. PERRY, JR. (Ph.D. Clark 1957) is Chairman of the Geography Department of Massachusetts State College in Worcester. He delivered a paper at the Water Resources Conference, "Water Resources and Water Utilization in West Central New Hampshire," in Las Cruces, N.M., in June. Dr. Perry received an N.S.F. research grant to study water resources and water use in the American Southwest last summer and in August he studied agricultural land use in Chihuahua. He prepared, with Henry Warman, "Alpha Map Transparencies--North America," published by Allyn & Bacon, Inc.

THEODORE S. PIKORA (M.A. Clark 1964) is Instructor of Geography at Salem (Mass.) State College. He attended the East Asian Studies Institute at the Univ. of Hawaii during last summer.

RICHARD E. PRESTON (Ph.D. Clark 1964) is Associate Professor of Geography at San Fernando Valley (Calif.) State College. He will spend the 1968-69 academic year on sabbatical leave, working on the role of cities in the development of the Pacific Northwest. His recent articles include: "Urban Development in Southern California Between 1940 and 1965," Tjidschrift Voor Economische en Sociale Geographic; "A Detailed Comparison of Land Use in Three Transition Zones," Annals of the Association of American Geographers; and "The Three-Sector Hypothesis of Transition Zone Structure: Its Validity and Practical Duplications," The Town Planning Review.

GEORGE B. PRIDDLE (M.A. Clark 1964) is Assistant Professor of Geography at Waterloo Lutheran University. He was married last August and spent the autumn doing research for his dissertation, sponsored by the Geographical Branch, Ottawa and Canada Council. With Chad Day and Ian Burton, he has started an inter-university seminar on resources called GIRMS (Geographical Interuniversity Resource Management Seminar). Mr. Priddle is actively involved in analyzing local recreation facilities--their supply and demand. He will spend the summer of 1968 at Clark continuing work on his dissertation.

MERLE C. PRUNTY (Ph.D. Clark 1944) is Chairman of the Geography Department at the University of Georgia, in Athens. He is "currently 'loaded' with 30 resident Ph.D. candidates, 50 graduate students, 100 undergrad majors..." and a staff which now numbers 20 and is due for expansion by 5 to 6 members by next fall. He is preparing four journal articles for publication, as well as a text manuscript. Dr. Prunty is currently directing a project in the remote sensing of grassland fires (using Florida-So. Georgia test sites) designed to produce assessment of areal and temporal incidences of fire phenomena in Latin American savannas as related to their settlement potential. He is serving on the A.A.G. National Council and the Geographical Advisory Board of the Graduate Record Exam for Educational Testing Service.

ETHA M. PREISER (M.A. Clark 1954) is Associate Professor of Geography at East Stroudsburg (Pa.) State College. He taught Climatology and Cartography at Inter-American University in San German, P.R., during the 1967 summer session and plans to attend the I.G.U. meeting in Delhi in 1968.

LOUIS O. QUAM (Ph.D. Clark 1938) is Chief Scientist, U.S. Antarctic Projects, National Science Foundation. He left the Office of Naval Research in August 1967, after 17-1/2 years of service and received the Superior Civilian Service award upon his departure from the Navy Dept. After presiding at the annual meeting of Section 3 of the AAAS in New York Dec. 26-30, he left for the Antarctic to visit various stations and research projects and participate in the Deep Freeze Planning Conference.

ERWIN RAISZ (Faculty 1945-59) works for the National Atlas Project of the U.S. Geological Survey and in collaboration with Prof. William H. Goetzmann prepared the historical pages of the U.S. National Atlas. Another of his recent interesting tasks was the transformation of Gemini photographs into geographic maps, some of which he will present in Delhi. Dr. Raisz's Cartographic Workshop has been busy preparing geographic and geologic text illustrations.

AGNES C. RENNER (M.A. Clark 1940) is Associate Professor of History and Geography and Chairman of the Division of Social Sciences at St.Ambrose College. Last summer she participated in a seminar in Comparative Education, traveling to East Germany, Moscow, Irkutsk, Bratsk, Ulan Bator, Alma Ata, Tashkent, Kabul, Bulgaria, and Athens.

EDWARD RISLEY (B.A. Clark 1946; 1946-48) is Executive Secretary of the Committee on Remote Sensing of the Environment, for the Division of Earth Sciences, National Academy of Sciences. He is also a member of the Editorial Board of a new inter-disciplinary journal, Remote Sensing of Environment, which will begin publication in the spring of 1968.

WALTER W. RISTOW (Ph.D. Clark 1937) is Chief of the Geography and Map Division, Library of Congress. The following are his recent publications: "Alfred T. Audreas and his Minnesota Atlas," Minnesota History, Vol. 40, Fall 1966; "Seventeenth-Century Wall Maps of America and Africa," Quarterly Journal of the Library of Congress, Vol. 24, January 1967; "Maps and Globes," The New Book of Knowledge, 1967, M Volume; "Recent Facsimile Maps and Atlases," Quarterly Journal of the Library of Congress, Vol. 24, July 1967; "The Emergence of Maps in Libraries," Special Libraries, Vol. 58, July-August 1967; "Map Librarianship: One of the Underdeveloped Areas of Library Education," Library Journal, Vol. 92, October 15, 1967; "State Maps of the Southeast to 1833," The Southeastern Geography, Vol. 6, 1966.

FREDRIC A. RITTER (M.A. Clark 1967) is Chief of Comprehensive Planning for the Baltimore County Office of Planning. He spent the summer of 1967 in the United Kingdom and is working on his dissertation under Prof. Raymond E. Murphy.

J. LEWIS ROBINSON (Ph.D. Clark 1946) is head of the Geography Department at the University of British Columbia. His travels for the past year include a May 1967 trip to Japan, Taiwan, and then to Hong Kong to fulfill his duties as External Examiner for the Geography Department of the University of Hong Kong. In August he accompanied a one-week inspection trip to certain settlements in the Canadian Arctic. Dr. Robinson has submitted to the Queen's Printer in Ottawa a manuscript for a booklet, "Resources of the Canadian Shield," and has completed another manuscript, "Trends in Geography in Canadian Universities," to be published in The Canadian Geographer, Winter 1968 issue.

CAROLYN J. RYAN (M.A. 1963; Ph.D. Clark 1964) is Assistant Professor of Geography at the University of Connecticut. She spent three weeks in California last summer "for pleasure and gawking." Her current research, being sponsored by the University of Connecticut Research Foundation, is a case study of Travel Patterns of Residents in Mansfield, Connecticut.

BARBARA SAYDAM (M.A. Clark 1958) is Senior Research Assistant for the Department of Planning and Urban Development, City of Providence, R.I. In this capacity, she worked on Providence's application for a grant under the Model Cities Program. Her son Erol, age 7, spent four months in Turkey with his paternal grandparents, and Demir, her husband, is attending Dr. Bell's Economics class at Clark.

EARL B. SHAW (Ph.D. Clark 1933) is Professor of Geography at Assumption College in Worcester. He has maintained a light schedule of teaching, writing and traveling.

ADA M. SHAWKEY (residence 1947-1948, summer 1953, Clark) is Chairman of the Geography Department at Mass. State College in Framingham.

JAMES A SHEAR (Ph.D. Clark 1952) is Professor of Geography at the University of Georgia.

JOHN C. SHERMAN (M.A. Clark 1943) is Chairman of the Geography Department at the University of Washington in Seattle. He has continued work on maps for the blind and

participated in experimental design and testing of maps for partially-sighted children. He has also explored potential applications of remote sensing (primarily infra-red) to biological census-taking. He has published Oxford Regional Atlas--United States and Canada, Clarendon Press, Oxford, 1967.

VICTOR W. SIM (M.A. Clark 1957) is Associate Professor and Co-ordinator of Graduate Studies, Dept. of Geography, University of Western Ontario, in London, Ontario. He has been engaged (with five other members of his department) in the construction of a computer-oriented regional data bank of the local four-county area.

ROBERT B. SIMPSON (M.A. 1933; Ph.D. Clark 1941) is Associate Professor of Geography at Dartmouth College. In addition to his teaching duties, he is continuing his research into imagery evaluation, with emphasis on radar. He attended a short course at the University of Michigan last summer to bring himself up to date on infra-red sensors.

HELEN L. SMITH (Ph.D. Clark 1958) is Lecturer in Geography at Chulalongken University in Thailand. She is as well a consultant with the Stanford Research Institute on Village Information System--Thailand (VIST-Project) which concerns Thai geographical place names. Her recent paper, "Changes and Trends in Thai Vegetable Production," will be published in the Journal of the Siam Society. Her paper on vegetable production will be given at the IGU meeting in New Delhi.

JOHN A. SOBOL (M.A. Clark 1949) is Associate Professor of Geography at Memphis (Tenn.) State University.

FRANK J. SPARICIO (M.A. Clark 1963) is Assistant Secretary of the Hartford Insurance Group, in Hartford, Conn. He began this job in January of 1968. He describes his work as a "combination of real estate and research involving feasibility, acquisition and development of office building locations on a national scale."

KARL STACEY (Ph.D. Clark 1955) is a research professor at Australian National University in Canberra. He is spending 9 months in Australia doing research studies involving estimation of petroleum production and consumption in Australia for the next 25 years and their effect on imports and foreign exchange. His family of 4 is with him and they all find Australia "challenging!."

ROBERT G. STONE (Clark 1931-32) is Chief Scientific and Technical Information Officer at Air Weather Service, Scott Air Force Base. He reports: "because the Air Weather Service is now engaged in solar and ionospheric forecasting, the scope of my work has considerably expanded-- which keeps things interesting."

JOHN LEWIS TAYLOR (M.A. 1949; Ph.D. Clark 1953) died on August 29, 1967.

R. PAUL TERRELL (Ph.D. Clark 1949) is Jeffries Professor of Geography at Western Kentucky University in Bowling Green. His recent article, "Newsprint Production in the Southeast," was accepted by Journal of Geography for publication. His maps, "Paper and Paperboard Mills in the Southeast, 1967" and "Cellulose Pulp Mills in the Southeast, 1967" were published in the April 1968 issue of Southern Pulp and Paper Manufacturer.

GRADY O. TUCKER (Ph.D. Clark 1957) is Vice-President and Division Manager of Larry Smith and Company, a real-estate consulting firm, in Washington, D.C.

LESTER WINTERBERG (M.A. Clark 1961) is Regional Director of Candeub Fleissig and Associates.

EUGENE VAN CLEEF (Ph.D. Clark 1926) is Professor Emeritus at the Ohio State University. His 1967 publications include: "The 500-Mile Circle, "Bulletin of Business Research, Ohio State University, Vol. XLII, No. 1; "Downtown--Demolition or Renovation," "Journal of Property Management, Vol. 32, No. 4; "The Branch Bank--A New Neighbor," Banking, Journal of the American Bankers Association, Vol. LX, No. 4; "The Road to a Revitalized Columbus," Columbus Business Forum, Vol. 3, No. 9. At this writing, Dr. Van Cleef is touring Central Europe.

KRIPA N. VARMA (Ph.D. Clark 1956) is Professor and Head of the Geography Department at Government Post-Graduate College.

CHARLES B. VARNEY (M.A. 1953; Ph.D. Clark 1963) is Professor in the Department of Geography-Geology at Wisconsin State University in Whitewater and is Director of the University Honors Program there.

PAUL PETER VOURAS (M.A. Clark 1951) is Professor of Geography at Paterson State College in Wayne, N.J.

MILES W. WEAVER (B.A. 1950; M.A. Clark 1951) has recently sold his interest in a business venture. He is looking for an administrative and teaching position in junior or four-year college. His son David is now at Tilton School and plans to interview at Clark this spring for possible entrance in 1969.

ROBERT S. WEINER (Ph.D. residence 1964-65) is on leave from the Geography Department at Briarcliff College. He spent the summer of 1967 doing field work for an urban political study of Nashville, Tenn. The fall semester was devoted to teaching at Briarcliff. He spent part of January 1968 in Puerto Rico with Peter Sakalowsky (M.A. Clark 1966) experimenting with 40 students with a view to establishing a field course for credit in the future.

NEILS WEST (M.A. Clark pending 1968) is now completing his Ph.D. residence requirements at Rutgers University and will be teaching at Rutgers-Newark in the coming academic year.

SEYMOUR I. WEST (M.A. Clark 1941) is Contact Specialist for the U.S. Government in Philadelphia, Pa.

HARLAND W. WESTERMANN (Ph.D. Clark 1959) is Director for the Center for Urban and Regional Studies at V.P.I. in Blacksburg, Va. He spent a total of two years and eight months (three visits) in Turkey from 1960 to 1963, where he worked with the Division of Industry of the Union of Chambers (private sector) to develop organized industrial districts.

MARY CAMERON VOGT WOODLAND (M.A. Clark 1943) is a Research Geologist in the Branch of Geochemical Census, U.S. Geological Survey, part-time. She is President of the Homewood League of Women Voters. She uses her geography background in her League studies, which include metropolitan Chicago problems (urban and physical geography), water resources, and foreign economic problems (economic and political geography).

DAVID C. WINSLOW (Ph.D. Clark 1948) is Professor of Geography and Director of Aerospace Workshops for the Department of Geography at Indiana University of Pennsylvania. He is making a quantitative study of container shipping in the West Indies, which has entailed trips to Puerto Rico and Jamaica. He continues to edit The Pennsylvania Geographer and is also editing a Handbook for Gamma Theta Upsilon. Dr. Winslow also taught a graduate course in field geomorphology at Bloomsburg State College last summer.

LEO J. ZUBER is with the Planning Branch, Region IV, Department of Housing and Urban Development.

Under the direction of Dr. Van Valkenberg a series of special lectures were arranged for the Department. Clark faculty, doctoral candidates, and geographers from other universities were invited to speak. The following is a list of the participants and their topics.

James M. Blaut	"De-Natured Geography"
Hans Boesch	"Mission to Indonesia"
Harold Carter	"Growth of the City System in Wales"
George Downey	"Problems in Environmental Quality: A Case Study"
Howard L. Gauthier, Jr.	On the Development of Transportation Networks in Brazil
R. L. Heathcote	On the Image of Australia During The Nineteenth Century
Fred E. Lukermann	On Place
J. Richard Peet	"Location Theory as the Central Integrating Theme in Economic Geography"
Gerald Rushton	"Scaling of Location Preferences"
David Stea	"Cognitive Maps and Human Orientation; Some Preliminary Ideas"
Samuel Van Valkenberg	"A History of Geography at Clark University"
Michael Woldenberg	On the Hierarchy of Central Places
Robert Weiner	"The Impact of a Changing Jurisdictional Pattern Upon the Urban Landscape"