

identical. In the seven classes in grades 4 and 5, the automatic spelling exercise came first four times, and each time the median score for rational spelling was slightly higher. In the same classes, the rational spelling exercise came first three times, and each time the median score for automatic spelling was slightly higher. This might indicate that the pupils in grades 4 and 5 were more influenced in their spelling by the general newness of the situation than they were by the kind of exercises used. It also shows that fatigue was not an important element in the experiment.

While the data are meager, they tend to substantiate the conclusions reached in the Cleveland Survey, namely, that there is very little difference in spelling accuracy due to using either the rational or automatic method. This is contrary to the rather common notion that automatic spelling is less accurate than rational.

XXXIII. THE MAGNETISM OF THE MAP

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A French writer once said: "Le temps le mieux employé c'est celui qu'on perd,"—"The time best spent is the time we waste." This is true in many respects, but the truth of this saying is especially important when applied to children. We map out the day's schedule for them and we dole out to them so much for arithmetic, so much for reading, so much for physical exercise, so much for recreation. And all the time the child tries to break these bonds, to do something else, to "waste time," as we call it. Yet, watch a thoughtful, intelligent, active, normal child during the moments which it has for itself legitimately or illegitimately. As a rule it learns during this "wasted" time more than during the time of imposed study. Unfortunately, there are so many definite facts, the knowledge of which our complicated life demands imperatively, that we cannot leave the children to gather their information in a hap-hazard way and must teach them systematically.

But our children are comparatively free before school age. It is then therefore that we can reap a rich crop of psychological truths by observing their natural inclinations, the methods they use in getting acquainted with the outer world, the problems they become interested in, and the ways in which they solve them. Thoughtful, bright, precocious children are of special value from this point of view, because they approach in their pre-school age problems and subjects which we find necessary to bring before other children at a later age.

Thus, geography in school presents to the teacher many pedagogical problems. But if a child becomes interested in geography before it reaches the school age, then, free from any responsibility for the choice of method, we can observe its own approach to the subject, its own way of dealing with it.

I have a detailed record of one little boy's interest in geography. And in the short time allotted to me here I shall endeavor to discuss only his fascination by the map, with as many asides to other geographical matters as will seem necessary for a better treatment of the boy's map studies.

The little boy A.,—a normal, healthy, lively, bright child, has been from babyhood an observer and a thinker. The university communities in which he has always lived and the atmosphere of study in his home were indeed favorable influences in his mental development. Until he was five and a half years old no information was imposed upon him, or even offered without his own inquiry or some proof of his interest in the matter. But all his questions were answered conscientiously and truthfully and all his investigations, inquiries and experiments were greatly encouraged.

At the age of two he liked to look at the sky and would often say: "The sky is pretty, see?" He would often look for the moon and, whenever he had a chance, would admire the stars. The hills he saw in the distance, the beautiful sunsets of Colorado, the streams and springs had their share in awakening A.'s appreciation of beauty; but they also appealed to the child scientist in him. For all children are both: as artists they admire the beauty of their surrounding, as scientists they ask you: "What is this?" or they try to find out the different laws of nature.

From the age of two years and four months A. had the privilege of observing the sunrise quite often, and when he was three years old, he knew East, West, South and North and began to talk in these terms.

When he was three years and four months old, he found in a rubbish heap an old text-book on geography. He became interested in the illustrations, and, seeing the maps, asked: "what is this?" I said: "this picture is called a map. But I'll give you a better picturebook. You can't understand this one." But he insisted: "I want to look at this map," and I left the book in his hands. He looked at the maps quite long, but I don't know what he saw there or what interested him. I did not doubt at that time, that it was coloring of the map that attracted him. But I came since across another boy's interest in maps. This other boy, C., became interested in maps at about the same age as A. (three and a half years),

but his first maps were his father's transportation maps, with only a network of railroads on them, without any coloring.

Both boys were deeply interested in street-car tracks, making them whenever they had a chance: on the ground, in the sand-pile, with pencil on paper, etc. At the same time A. liked to follow the designs on rugs, the twist of the wires on fences, railroad tracks. And when he became familiar with the conventions of the maps and knew how to find rivers, he would never get tired of tracing a river to its source and down to its mouth. At the age of five years nine and a half months he received an atlas, which contained, among other things, a map of the routes of famous discoverers. It became A's delight to study these lines, and, as he could not yet read, he would come to me for information as to what these lines meant. His enthusiasm in this direction was so great, that we found it necessary to curb it, or he would spend all his time over it, straining his eyes, missing his meals, not getting enough exercise, and imposing the atlas on every one.

Between the ages of three years seven months and four years nine months he was greatly interested in plans. His parents were then studying plans of houses with the view of buying or building a home, and he liked to look at these plans, and very soon learned to understand them and to make some of his own. At the age of four years and two months he often made attempts to make a crude plan of our neighborhood, without calling it "plan" however. From the age of six he begged for a map of Norman, several times tried to draw one himself, and when he finally obtained a plan of the city of Norman—at the age of seven and a half—he studied it so carefully, that he found some mistakes in the distribution of the houses.

Perhaps his love for the map is partly due to his taste for exactness; he wants to know the exact location of places. When he looks up any city on the map, he is not satisfied with the "more or less" indication, he wants to know the exact spot, its position relative to other known places, and very often its exact latitude. He has expressed himself repeatedly as preferring "The Swiss Family Robinson" to DeFoe's Robinson Crusoe: "You see, I can't tell about Robinson Crusoe just where he went—it is always just SW by S or something like it; but in Swiss Family Robinson there is a map, and everything is plain, every time they move I know exactly where and how"—this at the age of eight and a half.

The sky map is just as interesting to him as geographical maps. He saw a sky map for the first time at the age of eight years and two months. He knew then already several constella-

tions, and immediately proceeded to look them up on the sky map. He has been studying the sky map now for about six months, at first at rare intervals, later every night; he usually finds new constellations and stars in the sky himself, guided by the monthly sky map.

A.'s interest in map study, awakened at the age of three and a half, grew steadily and at an increasing rate. There was never a time when he was not interested in maps. In his arithmetical interests I noticed some seasonal influence; there were periods when his interest in arithmetic was at a low ebb. Not so with geography, and particularly with map study. He invented a number of different "games" which enabled him to pursue his studies. Thus, at the age of six years and eight months he arranged his little table, with his atlas on it, to represent an "office," and announced, that he has a "shop," in which orders are taken for information "about the world or trips, anything you want to know." And he begged his father, his mother, and all the adult friends of the family to give him "orders." Here are a few of the "orders": "Write out the states of the Atlantic coast; the states of the Pacific coast; states through which you must pass going from New York City to the Pacific ocean," etc. He wrote these "orders" very carefully and worked with great enthusiasm, asking for "orders" anxiously and assiduously. Some of the answers he copied on the typewriter. Another "game" consisted in making imaginary trips. At the age of eight and a half a new game appeared, which he has been imposing on me for over two months now almost every day. He wants me to mention a river, a mountain, a city, an island, a peninsula, etc., and he tells me from memory its location. He worked out rules for keeping a score, and never gets tired of this game, though I often try to escape it. Very often he makes maps of his own, representing imaginary lands.

Analysing the above and other facts concerning A.'s interest in map study, I found that this interest is based on three elements: 1. The first and earliest was undoubtedly the attraction of bright colors. 2. The second chronologically was that of following and disentangling an intricate combination of lines. This aspect of the map had an additional attraction in the fact that it suggested railroads. A. was deeply interested in railroads and trains from the age of eighteen months, and the lines on the maps which to him represented railroad tracks appealed to him greatly.

3. The third, the highest and most complicated aspect of his map studies is, of course, that of location of places, of the form and shape of islands and continents, and so on. This side of his map

studies naturally grew in scope and intensity as A. matured and as his general geographical knowledge increased.

This, really geographical aspect of A.'s map studies is a combination of three kinds of interest:

1. The romance of the far-away, the appeal that foreign lands have for an imaginative mind, the wonders of the unknown—the imaginative interest.

2. The thirst of knowledge of the wide world, the desire to know the exact location of places, the need of orientation—the scientific interest.

3. The similarities and differences between different places as to their coast-lines, surface, irrigation, etc., as seen on the map, bring out questions, awaken A.'s reasoning, and serve as basis for his contemplations, discussions and hypotheses. This is the philosophical interest. Thus, many a hypothesis has he formed concerning the origin of different islands, of some coast-lines. One of these is that the Aleutian islands used to be part of Alaska. Similarly, he has formed hypotheses concerning celestial bodies. Here is what he thought of the moon at the age of five years and eight months, as nearly as possible in his own words:

"The moon is like the letter O, with a big hole inside. In the daytime all the sunlight collects there in that hole. And at night these sunrays shine, and the moon looks bright. But there are some terribly high mountains on earth. They throw their shadows on the moon, which makes dark spots there, and these dark spots look like "the man in the moon."

A. wanted once to look up on his map the "terribly high mountains" that cause the man in the moon to show up, and upon this occasion informed me of his hypothesis.

Another time, when he was eight years and four months old, he said: "Oh, I know what'll help us in our history. You see, we are learning now about Captain Smith. Now, I'll tell the teacher that there is a star, on which we see now what happened on it when Captain Smith lived. *I can* say that, can't I? Light travels so long from some stars, there surely is among them one from which it takes the light to travel so long, so long, you know, the time since Captain Smith lived. Don't you think so?" Then he thought a while and chuck'ed, and then exclaimed, "Well, mamma! If it take *light* so long to come to us from the stars, how long would it take *sound* to come? If there was any sound there—suppose there is a sound—why it would not reach us for so long. And—well—how do we know? Maybe there are sounds there; but the first sound that ever happened there maybe could not come to us yet, since

creation; maybe it was travelling all this time, since the beginning of the world, and has not come to earth yet. Can't it be, mamma?"

A.'s hypotheses fall into two groups: those which he himself knows to be hypothetical, and those which he thinks are truths. These latter are beliefs and conceptions based on misunderstood information. The man-in-the-moon theory belongs to the second group, while that about the sounds from the stars is a real hypothesis.

XXXIV. A COMPARISON OF THE SIZES OF THE VOCABULARIES OF FIFTY CHILDREN OF THE SAME AGE

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For several years I have been collecting the vocabularies of children at the age of eighteen months. It was my hope that a careful study of such vocabularies might throw some light upon several problems of child psychology and education, such as: A child's earliest interests; the normal range of vocabulary among normal children of the same age; and the differences between the sexes, if such difference exists in the matter of speech development.

I have now collected fifty-one of these vocabularies almost evenly divided between the sexes. My friends have helped generously in gathering the material; and I am especially indebted to Mrs. Margaret Morse Nice, who has made so many interesting and valuable studies of the speech development of children. It is not my purpose at this time to make an intensive study of the contents of the vocabularies, but to examine their size, and to see if any deductions can be drawn in regard to the average or normal number of words of boys and girls at the age of eighteen months.

My material arranges itself as follows:

Cases Collected from Published Studies

Name	Sex	Source	Total Words
1. Allee -----	Male	11	1
2. Cary -----	Male	8	60
3. Gale 2 -----	Male	6	113
4. Oatman-Blachly 1 -----	Male	1	113
5. Nice 2 -----	Female	11	0
6. Nice 3 -----	Female	11	2
7. Drummond -----	Female	5	7
8. Gale 3 -----	Female	6	33