

from a photographic image. When he has that wide a scope, we must consider that "virtually anything" includes animal, vegetable and mineral. A ground photograph might show a rabbit (the animal) in a cabbage patch (the vegetable), growing on a well drained soil (the mineral). How does one prepare an associated key to describe this particular scene? It seems to me that regardless of what your ultimate objective is, you first have to tell how to identify a rabbit, second, how to identify a cabbage from some of the other plants, and finally, how to identify well drained soils.

From the limited experience I have had in preparing photo interpretation keys, my approach without question would be first to describe each of these separately. If you will, there would be three separate subject keys. I certainly would not stop at that point since I endorse the associative concept, I believe, as whole-heartedly as the speakers who favor it. I would have as a fourth and final section then, such

integrated analyses as the ones I have indicated here showing how the various components tie together in the various combinations to give conditions such as the one I just indicated.

If there is any comment on that I would be glad to hear it, especially from the past speaker.

MR. LANDIS: As I said, in the paper, we do not advocate using association keys exclusive of subject keys. The subject keys are part of the regional key and they very definitely have their utility. One of their utilitarian values is that they eliminate repetition from one association to another. It is not a matter of an association type key as *opposed* to a subject key but in *conjunction* with a subject key.

DR. COLWELL: Then would the approach that I indicated for this particular problem be essential to the way you visualize the way it should be done?

MR. LANDIS: That's correct.

## REGIONAL KEYS ARE VALID GEOGRAPHICAL GENERALIZATIONS\*

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THE title of this paper is loaded with semantic pitfalls. So let's try to avoid them. The statement is true at least on a theoretical basis. Regional keys by their very nature are geographic generalizations. The question of validity is something else. Let us first examine the statement—regional keys are geographical generalizations—and then discuss various aspects of validity.

Regional keys are prepared for various kinds of areas—in some cases for a whole country or a part of a country, or in other cases, for a group of countries. In most cases subject keys are made for the entire region or area, rather than for a series of regions within the over-all study area. The question has often been raised whether this procedure develops true regional keys

or merely a series of subject keys for an area—a political area that is usually large and non-homogeneous. A true regional key is one based upon distinctive combinations or associations of elements in an area. Let us assume that both types of regional keys are acceptable. Are both types geographic generalizations? The answer is yes, because the nature of geography is dualistic—dualistic in the sense that it deals with subjects and areas per se, and dualistic in the sense that it deals with man and nature. Thus, a regional key that treats only one subject in an area may be considered a geographic generalization.

The question of validity involves a variety of considerations, such as purpose of the key, availability of photos, ade-

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quacy of sample, scale and level of generalization, and quality of personnel. Let me single out the question of personnel for discussion.

The ideal person is one who has a discerning knowledge of the study area, based on long residence and wide travel. He is a specialist in at least one subject or element of the area, and he is a photo interpreter. Obviously such a person is difficult to find. One weakness of certain units engaged in producing regional keys is the paucity or complete lack of area specialists. It is presumed that photo interpretation experience is the prime requisite. I submit that area specialists are essential personnel for any project attempting to produce regional keys. An area specialist should also have a subject specialty. If he has had no prior PI experience he can easily acquire enough PI knowledge to make a key, provided there are on the project a few expert PI specialists to provide technical PI guidance. The reason for this assertion is that the most fundamental problem in making regional keys is to select and demonstrate the most characteristic, representative or typical elements of the area, and those most significant in terms of the purpose of the key. Only a person thoroughly familiar with an area is qualified to make such important generalizations and judgments.

To meet a majority of requirements for regional keys the ideal organization of a key is dualistic—subject keys for each major element in the study area, plus a series of associative keys for the distinctive regions of the study area. The former provides a dictionary of significant photo images for identification purposes; the latter provides regional orientation for all users—a way of thinking for the novice and a point of departure for the more advanced analyst.

Therefore, regional keys are theoretically, and may in reality be, valid geographic generalizations.

#### DISCUSSION OF DR. BLACK'S PAPER

QUESTION: Accepting momentarily your premise that regional keys are valid geographic generalizations, how do you divide a non-homogeneous region into smaller distinctive regions?

DR. BLACK: The problem of dividing a non-homogeneous area into regions is very

broad and difficult. Theoretically, a region is a homogeneous area where various elements exist together in association to form a general homogeneity that differentiates it from all adjacent areas. This is not a matter of photo interpretation but such interpretation, when brought to bear on the problem, is a tremendous asset. Most people dividing areas into meaningful regions do so in an armchair in an office, and by doing an awful lot of guessing. If a person has examined all the photo coverage of the areas, he then has a much more solid basis for determining these distinctive combinations. That is a geographic problem where PI is used as a tool to effect the solution.

QUESTION: My point was that you were dividing regional keys into two distinctive types, one which was based on geographic consideration and the other which was based on political consideration. The problem of differentiating the region from the geographic homogeneous sub-region is so broad that it would almost seem that the political division is just as valid as the geographic division.

DR. BLACK: A political region is a homogeneous region in at least one respect. It has the same political regime governing it. It is usually non-homogeneous in about every other respect, especially in terms of the various combinations of physical and man-made elements in the area. Most regional keys that are being made today are made for large political units or groups of units, but there is hardly a political unit in existence today so small that it is not susceptible of further sub-division into more meaningful combinations of things in the area. The purpose of dividing a large political region is to make things in association stand together to add the meaning and understanding of the way things are arranged in nature and what man has done with them.

QUESTION: I have two questions with regard to the personnel who would prepare the regional key. Do I understand you to say that these probably should be people that are very familiar with the region and that they would be aided by photo interpreters? If they are to be very familiar with the region, how can you explain the fact that people who are very familiar with the area or region, who were born

there, and lived there, when asked to identify an elementary object on a photograph on the scale of say 1:2,000, often cannot identify this object? This refers particularly to agricultural items. Many military photo interpreters have found that they cannot successfully call upon the local population to identify such items.

DR. BLACK: I mean no offense to the great body of photo interpreters, but the problem is essentially one of generalizing and selecting the things that are typical of the area. If a person has no familiarity whatsoever with the area to begin with, he must do an awful lot of familiarizing through examining pictures, reading, looking at movies and so forth, thus getting his knowledge secondhand. If he has his knowledge firsthand to start with, he would have a head start on his interpretation work.

You said that persons familiar with an area through long residence couldn't identify an agricultural item on a large scale airphoto. Your question was answered in my paper which stated the individual must be "a discerning person."

QUESTION: I don't know why the speaker phrased the title of his paper the way he did. The title makes it seem that he is on the defensive. It sounds like he is trying to write-off the subject matter. I don't think that should be done. Subject matter keys complement and in many cases, supplement the regional key.

DR. ROSCOE: Dr. Black was asked if he would take that subject, with that title, based on the fact that he is a regional specialist. Later in the program subject

specialists will talk about the keys with which they are most familiar.

DR. BLACK: I don't think that I wrote off the subject keys at all. In fact the last recommendation in the paper is that the committee be organized in a dualistic fashion; that first of all there would be a series of subject keys for the entire study area for identification purposes. That would be one level of abstraction. Then in addition there would be a series of associative keys for distinctive regions. This is really a little higher level of abstraction. So I was not writing-off the subject key at all.

QUESTION: I am disturbed by and cannot understand your use of the word "generalization" in your title. A map is a generalization. The aerial photo is a reproduction of the landscape but is not the generalization of it. The key also should not be termed a generalization.

DR. BLACK: I disagree with you very greatly. An individual photograph, as you point out, is not a generalization. But you can't put all the photographs of an area into a key. There would be no point in having the key if it included complete photo coverage. It would be so unwieldy that it would be unuseable. One has to select typical photographs after making appropriate generalizations.

QUESTION: Don't you select the typical things rather than the generalized things?

DR. BLACK: I mentioned at the outset that there are a lot of semantic pitfalls in this title, and I see that this prediction or statement was true. One has to generalize in order to select and present the varying aspects of typical objects or conditions.

## THE MECHANICAL ASPECT OF PHOTO INTERPRETATION KEYS\*

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IT HAS long been realized among photo interpreters that a mechanical P.I. Key would be of great advantage in expediting photo interpretation requirements for rapid identification of objects. Fre-

quently, our colleagues have commented in a jesting manner, that what the photo interpreter needs is a device whereby he pushes a few buttons and out comes the answer.

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