

A New Interpretation of the Interpretation Situation*

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ABSTRACT: *This paper suggests that the "P.I. Pool" potential for the armed forces is not as great as is indicated by the fact that 102 universities offer courses entitled airphoto interpretation. It further suggests that a competitive examination be given to all students completing these courses in order to have a more qualitative determination of what the "P.I. Pool" potential actually is. Schools scoring highest should offer summer courses with academic credit for instructors from universities and the armed forces who wish to initiate or improve courses in airphoto analysis. Lieutenant Colonel Custer's report gives an excellent quantitative picture of the situation but it is pointed out that this should now be augmented by a qualitative report based upon the results of a competitive examination.*

"... one of the soft spots in the intelligence/reconnaissance system has been our failure to provide photo interpretation capability consonant with the data gathering and processing systems."

THIS is a quotation from Lieutenant Colonel S. A. Custer's and S. R. Mayer's excellent master's-degree thesis at Boston University entitled *A Comparative Analysis of Curricula and Techniques Used in the Training of Photographic Interpreters*. The authors contacted and received answers from 102 universities and service schools in the United States as to the form and content of their courses in airphoto interpretation. The statistical results of their questionnaire were that there should be an excellent "P. I. Pool" available for the military photo-intelligence system through: 1) graduates from these universities; 2) military reserve training units at these universities; 3) and specialized courses at the universities for military personnel. The results also indicated that the instructors in these courses would make a good roster of civilian P.I. instructors for use in an emergency. This appears to be a good, partial answer to one of the problems of the intelligence/reconnaissance system.

However, before the military leaders



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make any moves in this direction, it appears advisable to first find the actual training *quality* of the various university courses. The questionnaire which Colonel Custer sent around certainly was as inclusive as a questionnaire can be. It is also about as *conclusive* as a questionnaire can be.

Colonel Custer reports that 67 per cent of the airphoto courses in geology depart-

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ments specialize in the identification of land forms, and yet in another table he reports that 78 per cent of the geology departments reporting do *not* use a photo key system of instruction. It is difficult to see how a student could be expected to analyze an airphoto and announce that the particular rock visible is a silty shale or an andesitic rock with interbedding of tuff if he does not use a system of keys or at least a systematic approach that amounts to a key. 77 per cent of the engineering schools reported that they did *not* use a key system and yet they also stated that 17 per cent of their courses were concerned with soil identification and 24 per cent with land forms. How can these engineering students tell a gravel terrace from a silt terrace without using a key-like system? If they cannot discriminate between these two terrace types, then why should the military want to send special students, or why should the military assume that they have a good "P.I. Pool" simply because 102 universities offer a course entitled airphoto interpretation?

Another facet for the military to consider is that either some of these courses are misnamed as *airphoto interpretation*, or they are truly attempting interpretation but are jumping in without first testing the temperature with a one- or two-semester toe of *airphoto analysis*.

The two terms, *airphoto interpretation* and *airphoto analysis*, are often used interchangeably. This should not be. At the Cornell Airphoto Center, the two are distinguished in this way. *Airphoto analysis* is simply a process of describing qualitatively and/or quantitatively everything, physical and cultural, that appears on a stereo-pair. Until a man can do that much efficiently he cannot start thinking about interpretation. The *interpretation of airphotos* involves analysis plus an interpretation of that analysis in the light of what intelligence information is required at the moment. The interpreter is usually a specialist in one or several fields who has later mastered the technique of airphoto analysis. The rest is simply a matter of applying his background knowledge to the information gleaned from the analysis. Therefore, it appears to be folly to name any first semester course "interpretation" even though the students may be professional geologists, photogrammetrists, foresters, etc.

We find it impossible to cover beginning *analysis* completely in one semester. Usually igneous and metamorphic rocks and their derived soils are either squeezed in at the last or they have to be held over for the next more advanced course in *analysis*. We find one semester is too short a time and yet we use a very systematic approach through an associative key method. How anyone in one semester without a systematic approach, can teach analysis completely and get into actual interpretation enough to label the course as such, is difficult to understand.

I quoted Colonel Custer's report *not* in an attempt to invalidate in any way his figures or statistics. His report is excellent and is being quoted all over the country. This indicates that he has helped fill an important gap in information about our field. I am only attempting to further interpret his report on interpreters.

Part of the problem is undoubtedly the result of inadequately trained instructors in the universities. This definitely is *not* the fault of those instructors. When most of them were going to college, there were not even mediocre courses being given in airphoto analysis. Sometime after the end of World War II a few men in the country who were excellent interpreters—as we have defined interpretation—offered courses in their universities or started using airphoto analysis and interpretation in their particular professions. In an effort to meet the demand and to keep up with the times, many universities decided that they *too* had better offer a course called airphoto interpretation. If these schools were already offering courses in photogrammetry, this was the department logically asked to create such a course. After all, it does involve airphotos and you do use them in photogrammetry, don't you? Usually there was no time, money or place for this photogrammetrist, geologist or geographer to get training in airphoto analysis. Therefore, he just did the best he could with the limited texts available, and necessarily leaned heavily on the specialty which he knew very well.

Also it often happened that an instructor in some subject was discovered to have been a Pfc. *Photo Interpreter* in the armed forces—thus the course was his—logically. This was based solely on his being able to discriminate between a gun emplacement and a U-shaped farm reser-

voir, or a highway from a railroad. Again, his present state of ability at analysis is not *his* fault; it is the fault of circumstance. Everybody realized the potential value of analysis and wanted courses given, but there were no places for the instructors to go for instruction.

It appears that the intelligence/reconnaissance system is not going to be saved by the fact that 102 universities have courses called airphoto interpretation. The solution will come only when these 102 turn out airphoto analysts of some ability. This can come about only when their instructors are given an opportunity to study this specialty with someone who specializes in it. How we can decide who is qualified to instruct instructors is another question! Possibly all of us instructors feel qualified; but there must be a qualitative line drawn somewhere.

Perhaps a panel of men who are not in the instruction field should study the 102, or at least those of the 102 who have the audacity to claim the ability to instruct instructors. Their study should end with a recommendation that several of these universities are particularly proficient, and should offer summer courses for academic credit for the benefit of those academic or military instructors who, since they have been handed the job, would like to learn to do it well.

I should like to suggest that someone from the Cornell Airphoto Center lead that panel—but I will not. Those with the most at stake should make this decision—the various military photo-intelligence men—the men who actually depend upon the information gained from university trained men under combat conditions.

There are several criteria which this panel of military men might logically use in deciding the relative merits of various schools:

- 1) Number of courses given in airphoto analysis/interpretation.
- 2) Number of years the courses have been given.
- 3) Number of students taking the courses.
- 4) Ratio of photogrammetry to airphoto analysis in the courses.
- 5) Academic level of the courses.
- 6) Prerequisites for the courses.
- 7) Plant facilities of the university.

These criteria have some value in the

determination and they are all included in tabulated form in Colonel Custer's thesis—but are not the *results* of these courses a better measure of their quality?

I suggest that such a group devise a simple test to be given to the various university students at the end of their semester's work. This test probably should not involve any questions or any instruments other than a simple lens stereoscope. The results should be evaluated on the basis of: "How much information of *all* types did students from this school extract from the same group of airphotos compared to students of that school?"

The test answers could be decided upon by a group of the country's leading and generally accepted authorities on airphoto analysis, and graded by them with no knowledge of what school's students they were grading. I believe that such a test would probably narrow the field to perhaps a half-dozen schools. If the field needed to be narrowed still further—then the above seven criteria begin to take on some qualitative value.

The results of such a comparative test—and I do not believe that the relative rank of the various schools below the top few should be public information—would be beneficial in several ways:

- 1) Very possibly it could take a few of us academic braggards down a notch or two in our own minds.
- 2) It would make some of the well-intentioned but low scoring schools sit up and take notice. I suspect that their deans and department heads would look with a more kindly eye upon an instructor's request that he be sent for a summer course.
- 3) Most important, it will make the "P.I. Pool" situation more clear and qualitative to the military leaders. Colonel Custer's report made the pool look cool. If the test substantiates this picture then the military leaders can relax a bit and stop worrying about drowning. If the results do not substantiate this picture, then the services can dig out the life-jackets which they may have put away.

If the results are poor, I would rather see the military not think about life-jackets but start thinking about teaching more of the men already in the "pool" how to swim.

DISCUSSION OF MR. CHENEY'S PAPER

MR. BELCHER: Does anyone desire to question Mr. Cheney?

MR. RUBIN (University of Michigan): In your paper I believe was mentioned a tentative ratio of about five data analysts to one photo interpreter. Will you discuss briefly the relative capabilities of each in terms of production from what they are given? I am thinking of a combat situation.

MR. CHENEY: These analysts are different from photo readers, they would be of a higher level, with a university degree, and with two or more good courses in photo analysis. On the other hand the interpreter might have five to ten years experience in at least one very important field, such as terrain or identification of certain military vehicles.

MR. RUBIN: If the field of activity were restricted to the land battle-field and to terrain and such details as tanks and individual objects were removed, do you believe it would be feasible to devise a simplified method of keying which would enable relatively untrained personnel to handle the photo analysis and interpretation at the battlefield area?

MR. CHENEY: I request the Moderator to answer the question as I don't consider myself as being an analyst.

MR. BELCHER: I wish you would insert the word "intelligent" following "untrained" and before "personnel" because a man with some intelligence can grasp this type of work and do a very commendable job without much field training. But in the broad category I don't know whether it's really intellect, a slant of mind, a nervous habit or something else. Many cannot do a satisfactory job regardless of the amount of training. Properly selected people with a small amount of training can feed terrain information to a person experienced in interpreting it. A man with military experience—battle experience—can interpret for specific purposes. Analyzing means producing basic data. Interpreting means knowing something about the applied methods of military, agricultural or other types of work.

MR. RUBIN: For a military situation, can you give an example of the difference between what the analyst and the interpreter would produce?

MR. BELCHER: Let's take tank warfare.

Analysts by the hundreds can produce terrain maps, but cannot determine whether a tank or a group of tanks can go through that type of terrain. He could say it is clay, silt or sand, or it's wet or it's dry. But only one who has been with tanks in military operations and with applying some common sense can interpret what these terms mean to a battle commander.

MR. RUBIN: Then you feel that a group of perhaps selected GI's and a single officer would constitute an effective terrain interpretation team?

MR. BELCHER: Yes.

MR. COLWELL (School of Forestry, University of California): In concurring with one comment by Professor Cheney, I will give a specific instance of the caliber of those sometimes selected to instruct photo interpretation courses. A young fellow came to me not long ago and said, "I have just accepted a position to teach a course in forest photo interpretation at the University of So-and-so. I have never had a course in forestry or a course in photo interpretation. Can you refer me to some references on the subject? So I heartily agree with Professor Cheney that we need a better selection of personnel and in many cases a better training of those who are not teaching. I realize there are some problems in accomplishing this.

MR. YOUNG (Forestry Department, University of Maine): I was one of those who replied to the questionnaire and I don't think Professor Cheney has been quite fair to Colonel Custer's report. I should like to speak somewhat in his defense. I teach two courses. Neither is called photo interpretation. I think that's true at a great many other institutions. I'm certain that my reply to the questionnaire stated the name of each course; one is called Forest Photogrammetry and includes interpretation as a facet; the other is named Photogrammetry; this is for geology students and again includes interpretation as a facet. So it's not so much a question of the interpretation as the proper evaluation of Colonel Custer's report.

102 universities are giving courses and I dare say a careful analysis will indicate that only a small fraction are giving advanced courses in airphoto analysis and interpretation. Most like mine are introductory courses.

I think we are preparing a reasonable pool, not because of our courses, but be-

cause of the nature of the speciality in which the student is majoring—forestry, geology, geography—and because he has been given an introduction to photogrammetry, to the properties of the photo and to a little of photo interpretation. I belong to the school of thought that believes a geologist can be translated into a military photo interpreter in a much simpler way than is possible for an intelligent GI who does not have a background in the earth sciences.

MR. DAVID VANCE (United States Army in the Department of Training Publication at Fort Belvoir): We have been looking for a P.I. key for the Army. I should like the opinion of Professor Cheney and of Doctor Belcher on the scope on what such a manual should be and

whether one could be constructed that would be sufficiently complete and yet sufficiently portable for field units. That's our main problem.

MR. BELCHER: My reaction is that this matter is so complex that now is not the proper time for adequate discussion.

MR. COLEMAN (Navy Photo Interpretation Center): For a long time we have been seeking satisfactory definitions as related to photo interpretation. Also photo reading. We now add photo-analysis. I suggest that since those at Cornell and Professor Cheney have very definite thoughts on this subject and these definitions, a written proposal could be prepared by them and then considered by the Society, and possibly incorporated in future editions of the MANUAL.

*Economic Aspects of Aerial Exploration**

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ABSTRACT: Aerial exploration accommodates itself to economical, efficient exploration of large concessions. For example; the million-acre concession held by Minex in Cape Breton.

Savings are made in: staking and registering, retention of favorable ground, elimination of duplication of service, and time and dollars from speedy elimination of unpromising ground.

The odds for successful development bear a ratio to the largeness of the area explored.

Large concessions, large financing, enable Minex to employ the best brains and techniques, which are often beyond the budgets of small companies.

The efficiency of large-scale methods is recognized by oil companies. Minex has proved the efficiency and economy of its methods and is committed to large-scale techniques and the acquisition of large concessions.

THE mining industry is now attacking vaster projects than were ever attempted before, and the application of the old adage that "Time Is Money" has turned the attention of our industry to a basic problem: "How fast can we efficiently explore ground?" For many companies the answer to the question of money, space and time is aerial exploration. I will describe how two mining com-

panies of which I am president have demonstrated the economic aspects of aerial exploration.

The mineral exploration corporation for three years has been carrying on a large-scale program of exploration on its one million acre concession covering the entire northern half of Cape Breton Island in the province of Nova Scotia. This concession is probably one of the largest blocks

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