

NEW SEARCH METHODS

--Keith Conover January 1982

As the body of scientific lost person search theory grows, our search tactics must change. "Scientific search" affects not only the Mission Coordinator and the Operations Officer, but the Field Team Leader and grunt searcher as well.

One new concept is the statistical approach to strategy. When we are faced with a lost person situation and we know the Point Last Seen (PLS), we may use several strategic approaches to select high probability areas for urgent search. For instance, we might inquire into the past history of the area: where do lost people around here usually end up? Is it on one particular trail, down in a certain ravine, or along a specific riverbank? If so, we have used a type of historical approach for our strategy. On the other hand, we might investigate the past behavior of this particular search subject. Is he likely to go downhill, uphill, to follow a trail, or to head cross-country? If he has been lost before, what happened then? Is he fascinated by waterfalls? Again, we are using a type of historical approach to search strategy.

Obviously, both types of historical approach will be used in arriving at an ultimate search strategy, as will information from other approaches and from ^{deduction,} just plain intuition, and experience. A problem sometimes arises during planning the strategy, the problem of how exactly to balance out the different information, and sometimes how to balance out the strategic opinions of the members of the Mission Staff. A formal method of balancing out the different opinions has been developed by Bob Mattson, called the Mattson Consensus Method (not by Bob). Briefly, it works like this:

The Mattson Consensus Method in Brief

We have divided our search area into five subareas: A, B, C, D, and E. Each of our three Mission Staff members (MC, OO, and Responsible Agent) assigns a percent probability to each sub-area, with the proviso that his five probabilities (A through E) total 100 percent. We add the three probabilities for each area, and divide by three (for three Mission Staff members); all we do is calculate the average probability for each area. The final average for each area is the basis for our search priorities, and we assign teams to the high priority areas first.

	MC	OO	RA	Total	Average
A	10%	25%	20%	55 + 3 =	18%
B	20%	20%	15%	55 + 3 =	18%
C	20%	25%	15%	60 + 3 =	20%
D	30%	25%	40%	95 + 3 =	32%
E	20%	5%	10%	35 + 3 =	12%
	100%	100%	100%	300% + 3 =	100%

I started out a couple of paragraphs ago promising to talk about a new approach to strategy, the use of statistics. Various search and rescue organizations, notably the National Association for Search and Rescue and its affiliates, are gathering information on lost person searches. Grouped by category of person lost, this information tells whether the lost people tend to go uphill, down hill, or on the same elevation, and how far they went in that direction, measured "as the crow flies." Thus, rather than relying on subjective impressions of what our search subject might do, we have objective data about what people like our subject actually do when lost. These statistics give us a firmer base on which to theorize. For instance, the original set of statistics, gathered and processed by the late Bill Syrotuck and presented in Analysis of Lost Person Behavior: an Aid to Search Planning, give us the following prediction. If we are looking for a small child (1-6 years old) in relatively flat terrain, the highest probability zone is not near the Point Last Seen, but is a "doughnut" or circular strip between 1 and 1.6 miles from the PLS in all directions. If the child were older, between 6 and 12, and in mountainous terrain, the highest probability area would be between 1 and 2 miles downhill; the probability he is near the PLS is similar to the probability he is 2 miles downhill from the PLS. Thus the statistical approach gives us some rough idea to start from, and may help modify our "common sense" by what really happens to lost people. Understanding this idea may perhaps help you understand the rationale behind some futile-seeming task assignments.

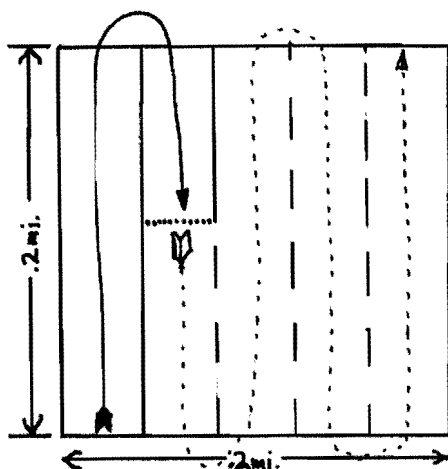
The most important new search concept for you to appreciate is that of non-thorough search, and why it is important not to use thorough search tactics except as a last resort. This may seem counter-intuitive, because common sense tells us to search hard and meticulously. Whenever we are trying to do something which is vitally important, especially a life-or-death matter like search and rescue, we tend to do our best to give our all, and to do the very best job we can. This usually means taking time to do things right, to double check all the knots, and to make sure all our vertical rescue systems have backups. However, for efficient search, we must search quickly and superficially, especially early in the search. The reasoning behind this is logical:

1. Early in a search, we are looking for a responsive victim who wants to be found, or at least one who will make his location visible.
2. We have a limited number of trained search teams.
3. A given team can cover a small area thoroughly with close-spaced line search, or a larger area with wider spacing or scratch and sweep tasks.
4. A responsive victim, or an obvious one, can be found as easily by a non-thorough search as by a thorough one (or almost as easily).

If you will grant that this reasoning is acceptable, then early in a search, we should use non-thorough methods such as scratch and sweep tasks to cover a large area quickly. Phase 2 of the SAROP, Scratch and Survey Searching, reflects this orientation. Anyone who has been on a mission with the ASRC probably appreciates this.

Good examples illustrating the importance of scratch searching abound; just recently, a search at Mount Rogers began with a big line search, rather than with scratch searches of high probability areas. The subject was found, but she was dead by that time. (Or so I heard; if I am wrong in saying this, my apologies to all concerned. However, I could cite other, but less recent, examples from my own experience.)

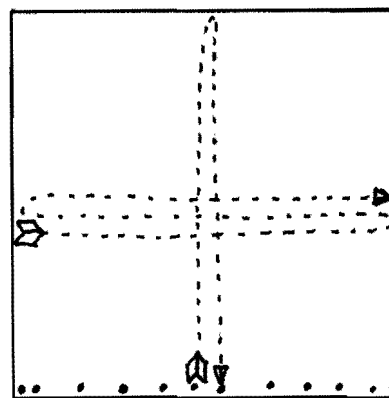
We may extend the idea of non-thorough search a bit further, and reach a result even further from "common sense" search ideas. Let's say we've sent scratch teams to the PLS, and along high-probability trails and ravines, but these teams have turned up nothing. At this point, traditional search methodology would have us start close-spaced line searches (saturation search) of high probability areas. However, the best, most efficient strategy is to use our manpower in very wide-spaced sweeps/line searches through the high probability. Of course, close-spaced and wide-spaced are ambiguous terms, but close spaced generally means 3 to 10 meter spacing (10-30 feet) depending on brush, and wide spaced means 10 to 30 meter spacing. A close-spaced line search expects to pick up every clue in its search area, whereas a wide-spaced line cannot possibly view every square meter through which it passes. It is more efficient to search an area several times with wide spacing than once with close spacing, given that the number of searchers expended in each are the same. This true for finding clues as well as bodies, and the calculations below are based on finding small clues. If we assume a responsive victim, then wide spacing looks even better. As with scratch searching, you have the additional advantage of searching the entire high probability area or areas "once over quickly" during the early stages of the search, increasing the chances you will find a responsive subject while the subject is still responsive. To help you visualize and appreciate this concept, look at Figure 1:



12 SEARCHERS AT 20' SPACING

POD: 90% after 3 hrs. 45 min.
(one sweep of area)

A.



12 SEARCHERS AT 100' SPACING

POD: 50% after 45 min.
(one sweep of area)
75% after 1 hr. 30 min.
87.5% after 2 hrs. 15 min.
93.7% after 3 hrs.
96.7% after 3 hrs. 45 min.

B.

Figure 1: Probability of Detection (POD) of an unconscious subject vs. time for thorough and non-thorough sweeps of a .2 mi. x .2 mi. area.

The great advantage of wide-spaced (non-thorough) searching, as in 1(B), is not that a team will really search the same area 5 times in succession, but that the team may search once with wide spacing and 50% POD, then move on to repeat this in four other areas; the non-thorough team can cover much more terrain. If we consider that the POD for a responsive or obvious victim is probably about 95% for both close and wide-spaced teams, the advantage of wide spacing is even greater.

If you would like to delve into search theory some more, please go to some of the secondary refernces. The treatment of these concepts here is brief, and much has of necessity been left out.

Close-spaced line search is a last ditch effort, and should only be employed after much scratch searching and non-thorough sweep searching. However, is there any advantage to the immediate use of close-spaced line searching at the beginning of a search? Yes. It is possible for you to take a large number of totally untrained searchers, to form them into a long search line, and to shepherd them down a mountain; with luck, only a few will get lost, and they might find something. However, due to searcher inattention, and due to breaks and varying spacing in the line, the POD is not as high as might be predicted for a close-spaced line search. Are there any disadvantages to wide-spaced line searching? Again, yes. It takes well-trained searchers to keep a wide-spaced line going, and the chance of losing searchers is greater. It takes better Base Camp organization to keep track of the progress and search area boundaries of many wide-spaced search teams, compared with just one or two large line search teams. The wide-spacing/scratch search tactics sound ideal for the type of search management the ASRC practices (no accident, that) but a problem crops up. We are in the position of coming in, telling the Sheriff that his traditional methods are no good, and that he has to use us to make the search work well. It's a sticky situation, and the problem is one of politics and PR rather than search tactics. The long-range solution is simple: education. The fundamental message, that there are far better ways than close-spaced line search, is a simple one. Pass it on; and maybe, you'll have saved a life.

To summarize:

1. The historical approach to strategy looks at the past behavior of those lost in the search area, and at the past behavior of the present search subject.
2. Deduction, intuition, and experience are major influences on search strategy.
3. The Mattson Consensus Method is a formal way of averaging different Staff members' evaluations of probabilities for search subareas.
4. The statistical approach uses information about the behavior of past search subjects to predict probable behavior of lost persons.
5. Scratch and survey searching is generally the first type of search task which should be used.
6. After scratch and survey searching, searches of all high-probability areas should be done with non-thorough, wide-spaced sweeps, with repeat sweeps through the same areas, if necessary.
7. Close-spaced line searching should be a last resort.