# *Natural Plans:*

## *Using AI Planning in the Analysis of Ethnographic Interviews*

MICHAEL H. AGAR and JERRY R. HOBBS

Ethnography needs a theory, as Kay (1966) noted some time ago. As a more specific instance of this general problem, ethnography needs theoretical guidelines for the analysis of "informal ethnographic interviews." When compared with most forms of social science interviewing, ethnographic interviews tend to be more under the control of informants than of interviewers. It is the informant, for the most part, who develops the form and direction that the talk will take. This kind of interview has proved invaluable in the core ethnographic task—understanding an alien way of seeing and acting in the world.

However, the problems in analyzing such material are formidable. An appropriate method should at the same time satisfy several constraints: (1) the interview should be segmented in a manner that respects the way that the expressions contained within it are structured; (2) the segmentation should preserve the holistic relationship between segments and the interview from which they are

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taken; and (3) the segmentation should facilitate the ethnographic goal of making inferences from interview material to the rich system of meanings necessary to understand it.

The usual suggestion for dealing with informal interviews emphasizes the emergence of categories from the content (Glaser and Strauss 1967; Bogdan and Taylor 1975; Spradley 1979; Agar 1980). While this is a useful suggestion, and an adequate one for some purposes, it does not meet the constraints outlined above. To the extent that the categories reflect topically coherent stretches of talk, they partly satisfy the first constraint; but this neglects the difference between topical coherence in a pair of utterances versus the same coherence over an extensive passage. With respect to the second constraint, the use of emergent categories leaves us with no sense of the overall interview context from which the material was taken. Finally, material is usually taken as resource for linkage with substantive analytic categories, rather than as topic for more elaborate analysis, as the third constraint requires.

To develop a more fine-grained approach, we would like to draw from recent work in planning in artificial intelligence. The use of AI theory in ethnographic work no doubt strikes some readers as bizarre, though we are not the only ones to consider it (Hutchins 1980; Werner 1978; Holland 1982; Suchman 1980). We view AI as an abstract language of pattern and purpose that, with modification, can give a more precise, theoretically interesting form to the construction of knowledge structures and attributions of intention that go into ethnographic understanding.

In its basic form, AI planning theory specifies the relations among a set of states and actions that transform one state into another. It holds this information in its "knowledge base." The planner is given a goal to achieve, where the goal is a state that it is to try to bring about. The planner also has a model of the current state of the world that defines its starting point. The problem for the planner, then, is to draw on the resources in its knowledge base to develop a plan to get from the initial state to the goal.

Some recent work applies planning to verbal material similar to the ethnographic interview considered here (Hobbs and Evans 1980; Hayes-Roth and Hayes-Roth 1979; Linde and Goguen 1978; Agar and Hobbs 1982; Schank and Abelson 1977; Wilensky 1978). However, for the most part AI work in planning has dealt either

with simple actions operating on physical objects in well-specified microworlds or with simple stories. Furthermore, the states and actions are represented in formal languages to facilitate representation for computer implementation. This suggests that we should be on the lookout for problems when we extend the planning metaphor to complex verbal material of the sort found in ethnographic interviews.

In this article, we would like to take a sample interview and apply some ideas from planning, with a view toward the necessary modifications required to obtain a better fit. Planning theory looks interesting because it immediately calls into the center a purposive agent drawing on a complicated knowledge base and acting in a world. We hope to show that extending the planning metaphor into the analysis of ethnographic interviews suggests a theoretical view that satisfies the constraints on the analytic task mentioned above.

The data used for this exercise is one of a series of life history interviews conducted with "Jack" (a pseudonym). Jack, at the time of the interview, was about 60 years old, a career heroin addict who first used heroin at about age 15 in Chicago. Jack was first encountered as a potential informant for an ethnohistory project. The early interviews wander a bit, since it was not clear what the purpose was at that point. By the time of the interview used here, the focus had clearly become Jack's life history.

The project was part of Agar's more general work in the area of urban U.S. heroin addict subcultures, ongoing since 1968. Recently, the material has been used as a case for the discussion of the more general problem mentioned above—how to approach the analysis of ethnographic interviews. An application of planning notions to the sample interview used here is intended as a part of that discussion.

## INTERVIEW AND SEGMENT

In AI theory, a plan is generated by the successive decomposition of a specified high-level goal until the primitive actions of the system are reached. In contrast to this top-down view, ethnographic analysis is often bottom-up. In other words, the "primitive actions" are available to the observer, and the problem of interest is to infer the plan of which the actions are partial realizations. Put another way, the emphasis is more on comprehension and less on production of action.

The first problem, then, is the identification of "primitive actions" most appropriate for the level of analysis we wish to engage in. For the ethnographic interview, the question becomes: "How does one segment the interview such that we have the basic actions that the plan must account for?" In particular, we want to satisfy the ethnographic goal of segmenting in ways that respect the structure of segments that the informant is in principle capable of making.

As mentioned earlier, in traditional analyses of this kind of material, one usually begins by marking off sections of the interview that topically cohere. "Topic," however, is a slippery notion that can be applied at several different levels, ranging from the entire interview to single utterances. Recent work in discourse analysis suggests the use of specific linguistic markers to indicate segment boundaries. However, there are problems with this strategy since the relation between specific markers and discourse function is many-to-many. (For a more detailed discussion of this problem, see Hobbs and Agar 1981a; Shuy 1981).

Another solution, grounded in work in cognitive anthropology, lies in the suggestion that there are "natural" folk perceptions of interview segments. We have not tested the idea in actual ethnographic work at this point. However, the assumption runs something like this. There is a way of segmenting the interview such that the segments will correspond to a group member's intuitions about when the answer to the query "What is this about?" will change. This procedure would yield a sequence of "natural actions," defining a level of analysis particularly appropriate for ethnography. It is this sequence that the plan would have to account for.

The procedure suggests that too fine-grained a cut would result in a member pointing to contiguous material as necessary for interpretation, while too broad a cut would allow repeated use of the question to obtain more detailed segments. To repeat, we have not tested this assumption here, since we do not have direct access to the informant who did the interview. Rather, we are trying to specify the guidelines we used in making the cuts for analysis with a view toward their eventual testing in subsequent ethnographic work. We made the cuts in an effort to reproduce what we think a member would have done. Our imagined member's sense of natural segments is facilitated by our mutual sharing of the relevant dialects of American English.

Often it is obvious when a segment begins and ends. There is a clear place in the interview where the answer to the question "What is this about?" changes in a sharp manner. For example, after Jack has talked about his first encounter in the prison with an inmate who wanted sex from him, he discusses prisons in general. Consider the following lines:

[discussing child-molesters] Now they say he knows right from wrong, maybe he does, but I've seen them when they wander around you know; and they are not really all there, you know and another thing they—wherever they get their psychiatrists, but they are the—you know the—the—the scum of the earth.

In this segment, there is a clear shift. Jack changes abruptly from a discussion of child molesters as an example of problems in prison to a discussion of the arbitrary use of authority by prison psychiatrists. Other shifts are equally clear, even though they may occur in mid-sentence. For example, in describing the trip from Chicago to New York, Jack talks about his stop in Toledo. He shifts from a humorous description of the city to an account of a party like this:

And uh the smoke and the—you know all of this, uh—he took us to a—a—a party uh in somebody's barn that had been converted into a playroom.

Usually the shifts are clear, though this is not always the case. Here is a more difficult example. Jack is talking about his arrival at the prison.

It was straight you know guys that were friendly and just wanted to be friendly, the guy that locked—or slept next to me. . . .

These lines were marked as signaling a change from a general discussion of inmates first encountered to a discussion of a specific inmate who would eventually demand sex from Jack. On the other hand, one could argue that the two fragments so divided were actually both related to the topic of "inmates in Jack's dormitory."

Yet another kind of problem is presented by what we elsewhere call "associative slides" (Agar and Hobbs 1982; Hobbs and Agar 1981b). For example, in one segment Jack was explaining that he knew how to hitchhike, but then he slid into an account of a trip to Idaho that was not relevant to the story. The segment begins with a sharp break, shifting from a discussion of the severed relations with family and friends. But then it slides from hitchhiking to a summary

of a couple of previous trips to a discussion of the trip to Idaho. The segment is kept intact because of the clear beginning and ending, but the center slides around without a core focus. (Later, other "sliding" segments will be shown to a play a role in changing goals.)

So, the summary of our argument runs something like this: For the most part, the interview divides into segments marked by a shift in the answer to the question "What is this segment about?" However, there are some areas of the interview where segmenting might occur in more or less fine-grained ways. Still other areas suggest vague or ambiguous answers: "It's sort of about. . . ." or "On the one hand it's about X, on the other hand it's about Y." But on the whole, the breaks are clear given an understanding of the content. Segment boundaries may occur over a few utterances rather than breaking sharply at a point, but they are usually clear nonetheless. Since the segments will be considered, as will be seen shortly, in terms of their relationship to the plan, the occasional lack of precision in cutting may not be of great importance. The segments will serve as the natural "primitive actions" which will be the basis for our inferences about the plan.

## THE INTERVIEW

In the initial segment of the interview, Jack and Agar negotiate the goal of the interview. Agar comes to the interview, having already conducted several with Jack, with the sense that there is a missing piece—Jack's move from Chicago, where he lived until his mid-teens, to New York City, where he lived most of the rest of his life. Together they converse until the goal has been mutually established; Jack now has a goal for the interview: "describe the move from Chicago to New York."

Jack begins his account of the move to New York by telling why there was no reason not to leave Chicago. Referring to previous interviews, he summarizes his family relationships—a devastating fight with his brother, the departure of his mother for California, and the hostility between himself and his father. Another segment characterizes his friends as a "dime a dozen." Having dealt with the subgoal of "why not leave Chicago," he now begins to relate how he left Chicago. He starts by reminding Agar that he had the means to leave Chicago. In an earlier interview, he told a story about hitch-

hiking to run away from home, so he recapitulates that ability.

So far, the interview is amenable to standard notions of planning. The goal is to describe the move: of the many possible ways to achieve it, Jack's story expresses two subgoals that enable him to leave—there was no reason to stay and he knew how to hitchhike. The first subgoal, in turn, generates segments that "describe fight with brother," "describe loss of contact with mother," and so on to "describe unimportance of friendships."

Jack then begins segments that satisfy the second subgoal, "describe how left." However, no sooner does he begin than he leaves the subgoal "how leave Chicago" and returns to the earlier one—"why not leave Chicago." He talks next about how in his travels he had seen other places which were better than Chicago, where he was not treated like "the scum of the earth." He then returns to the question of how he left, discusses his acquaintance "Bill," explains how he had met him, and describes how they made contact and decided to leave for New York together.

The problem of interest is the interruption of the second subgoal to return to the first. Logically, the way Jack can show that there was no reason for him to stay in Chicago is to show that for every plausible reason, it did not cause him to stay. Initially for Jack, the plausible reasons are his relationships with others—family members and friends. He has to say why each of these relationships was insufficient to hold him. When he interrupts the second subgoal to return to the first, it is to dispose of another plausible reason, the appeal of the city itself.

This is a problem that AI planning has not treated. In AI planners subgoals are accomplished, and then one moves laterally to the next subgoal or pops up to a higher level. AI planners may backtrack if something goes wrong during execution, but they do not capture the phenomenon of being reminded of another action for a subgoal that was already believed achieved.

Returning to the content of the interview, Jack then begins an account of the actual trip. It opens with an account of his Benzedrine use at the time, and then describes two stops on the trip in some detail. The first is Toledo, where Jack and Bill visited someone Jack had met earlier in Chicago. The second stop is Buffalo, where Bill knew a lawyer who had given him a standing invitation to stop by. Bill stays with the lawyer and Jack continues on to New York.

Now things get most interesting from a planning point of view. The goal that had been negotiated at the beginning of the interview is about to lose its guiding power—Jack is arriving in New York. Agar's request about the move from Chicago has been answered. But the interview is not over yet. The lower time limit on an acceptable interview has not been reached. Jack is constrained by the interview situation; he must keep talking. (In AI terms, this is called a "maintenance goal.") The next segments reflect this problem by shifting around among topics. Jack first returns to the topic of Benzedrine, discussing how it was becoming increasingly difficult to obtain over-the-counter. The problems in obtaining it lead him to place himself in New York.

Well I did get as far as New York before the shit hit the fan.

He begins to describe how he tried some drugstores, but then shifts in mid-sentence to his initial positive reactions to the city. Then, a new goal for the interview is suggested:

Now the first big routine that I ran into—that is the first explosive routine, I took—let me say this.

With that, Jack leaves what looks like a new goal and again discusses his reactions to the city, comparing them with his life in Chicago. Then he talks about how he didn't mind being known as a "42nd St. hustler" but that he didn't want to become known as a "faggot." He explains why the life of a "faggot" is a difficult one and gives as an example the hard life they lead in jail. He closes the segment with:

I'll tell you sometime—well maybe even now uh about my first experience in jail because uh I'm getting very close to it.

Then the next section begins with:

Uh the first explosion occurred one night when I was stoned out of my mind on goofballs.

From the various "slides" in the segments, a new goal for the interview has been created. Jack has given an account of how he moved from Chicago to New York by explaining why he left, how he left, and what the trip was like. He uses the quest for Benzedrine to

make the transition from upstate to New York City, slides around a bit with different ways of talking about his reaction when he first arrived, and eventually comes up with two new related goals—"the first explosive routine" and "the first sexual encounter in prison." Fortunately, the two new goals are linked, since the arrest resulting from the first led to the encounter of the second. With these twin goals established, the subsequent segments fall into line in a more organized way.

Now a first planning-related question is: "Having accomplished the goal, why not stop?" The simple answer is that the interview was not over. An "interview" usually ran from one to two hours, and Jack was paid for them. Stopping was out of the question. So, once Jack had accomplished one goal he fished around for and came up with another so that the talk could continue.

Goals come from somewhere. The original was socially negotiated; the second was created to satisfy the constraints imposed by the interview situation. The second was related to the first by temporal succession, not surprisingly since the emphasis on chronological ordering is a theme of life history interviewing. However, note that again the interview departs from AI approaches, since AI planning has not dealt with the problem of goal formation.

The next segments of the interview deal in a straightforward way with the specification of the first of the twin goals—"the first explosion." Jack meets Roy, and the two of them go out to break into cars. He describes how they were arrested and taken to the precinct house during the second break-in. They are transferred to the city prison and eventually sentenced. At that point, Roy disappears from Jack's life.

Then Jack talks about his sexual encounter in the prison. The first segments form a funnel, serving as background for the story by generally discussing prisons in the city, describing the specific one in more detail, and then moving into a description of the dorm where Jack was assigned. He then specifies the story of the encounter by talking about stories he had heard about prison sex and the anxiety he felt. He describes the first group he encountered as friendly inmates interested only in a bridge partner. Then he discusses how the inmate who slept next to him eventually woke him early in the morning and demanded sex. Jack picked up a boot and hit him in the head. He then discusses the other inmates' reactions, most of

which were positive, and the subsequent unpleasantness of the inmate who had demanded sex.

At this point, Jack again has the problem of having accomplished his goal in an ongoing interview. The rest of the interview has a rambling quality. Jack first talks about Black prisoners as supportive, then talks about the attacker, who was White, in a variety of ways—his ethnicity, his character, his subsequent treatment of Jack. He goes on to discuss prisoners in general, and then talks about their reaction to child molesters as a case in point. This in turn leads to a segment on psychiatrists, then back to a discussion of some kids who were locked up with Jack in the 1940s. He then talks about people's reactions in prison in general, makes some general comments on the confusion in society, and closes with a long segment on a recent encounter with some confused kids in the neighborhood.

Our sense of the completed goal occurs when the tape is turned over after the first hour:

J. Yeah so—
A. Let me flip this side Jack. . . .
[tape turned over]
A. I'll just get uh do a little more and call it a day. . . .
J. Alright, so anyway that's uh that was how I established myself as far as the joint was concerned.

At the completion of the goal, "the first sexual encounter in prison," Agar clearly signaled to Jack that they were finished with the interview. Interestingly enough, the signal comes at about the lower bound of an acceptable interview session, as indicated by the tape change. Either because of Agar's comments, or because Jack felt the same way, a third high-level goal does not emerge. The interview continues with a sequence of related segments which eventually slide to an account of a recent event that has little to do with the original story. Eventually Agar and Jack quickly agree to end the interview:

J. But these guys that uh you know are working for the—for the mob uh—
A. Jack let me—
J. Yeah call it quits huh.

At that point they shift to a discussion of the overall project and discuss a topic for the next interview as the tape recorder is turned off.

## THE INTERVIEW PLAN

Given this account of the interview, what sort of plan is suggested? The discussion is summarized in Figure 1. The first segment generates a negotiated goal, G1, which then organizes a sequence of segments that describe the move to New York by discussing the enabling conditions of "no reason to stay in Chicago" and "how leave Chicago." The goal is then specified by narrating "the trip." As the story places Jack in New York, a few segments slide around until a new twin goal emerges, G2-G3. The new goal in turn organizes another sequence of segments. The first specifies "the first explosion"; the second gives the background of "the prison"; and the third specifies "the homosexual encounter." Having accomplished this, Jack again moves into a series of segments that slide around until the interview is terminated.

First of all, notice how readily Figure 1 lends itself to a planning interpretation. Goals are decomposed into subgoals which are then realized in the segments of the interview. The classic hierarchical tree structure is not a bad model of the plan. However, there are certain problems. One is the return to a segment concerning "why not leave Chicago" (indicated by the dotted line in Figure 1). This requires planning to allow for returns to already accomplished subgoals, a minor modification.

Further, the "disorganized" segments, those that slid around internally, sometimes played crucial roles in the creation of goals. This requires us to view the interview, with much of conversation, as both a source and realization of plans, but planning theory is useful in both accounts. At the end of the interview, the segments did not generate a new goal; after several of them had passed, Jack and Agar agreed to terminate the interview.

With a few modifications, then, AI planning suggests some promising guidelines for the analysis of ethnographic interviews. At the same time, it is not offered as an answer to all the interesting questions that an ethnographer wants to ask of such data, but rather as a sensible way to reduce it into manageable pieces for analysis. We would like to briefly mention some questions for further research that this approach suggests.

First of all, the construction of early segments seems to guide the construction of subsequent ones. For example, this interview with

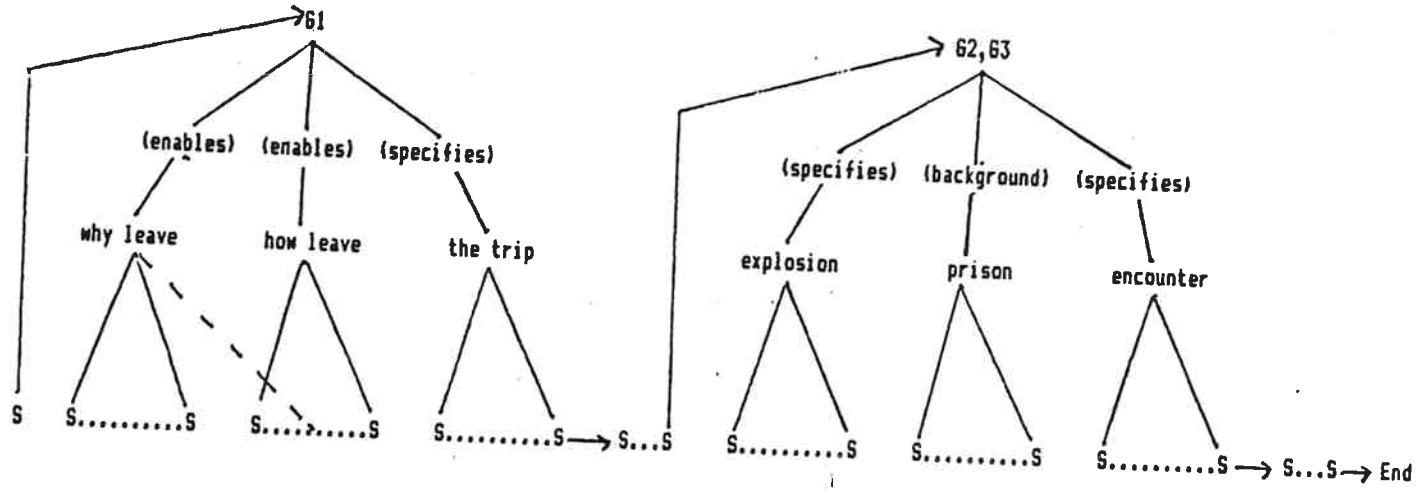


Figure 1. The interview plan.

Jack is, from its beginning, highly sexual in tone when compared with others. Sexuality is repeatedly used to characterize persons and activities, even becoming a part of the second high-level goal. We suspect that the filling out of early segments leads to a salience for parts of the informant's knowledge, such that those same parts are likely to recur in later segments.

Second, planning theory is used here as a guide to the analysis of a completed interview. To use Schutz's (1970) terms, our use of planning is most appropriate for the analysis of a projected or completed act. It is interesting to wonder what Figure 1 has to do with action—the processes through which Jack performed the interview at the actual time of its doing. He certainly did not think out something similar to Figure 1 before beginning, and then mechanically follow it to produce the interview. If planning is to be applied to action, then something like "planning on the fly" will have to be considered, where a goal emerges and a first action is taken at the outset. The plan will then be developed and modified as action proceeds. This kind of emergent construction of the social world, the research focus of areas like ethnomethodology (Leiter 1980), is not accounted for by our use of planning to analyze a completed interview. On the other hand, our analysis, pointing as it does to the importance of associative slides and emergent goals, may indicate the places in a completed interview where such planning on the fly did take place.

Finally, our retrospective development of the plan in Figure 1 is anchored in the interview text. We do not mean to argue that an understanding of the text as the expression of a plan that reflects its organization is the only plan-based understanding that is possible. At a lower level, a portion of text might be understood in terms of the plan of an actor in the story. At a higher level, we might understand the interview partly in terms of Jack's perennial need for money, or as a desire on his part to "set the record straight." However, in this article we have limited the focus to the interview as a phenomenon to be reduced for analysis with a view toward its construction by the person who accomplished it.

At any rate, these issues are intended only as examples of interesting questions raised by the application of planning to the analysis of ethnographic interviews. To close the discussion, we would like to return to the constraints on such analyses presented in

the introduction to see how adequately the use of planning satisfies them.

One constraint was to cut up the interview in such a way that the relationship between an isolated portion and the interview as a whole would be maintained. Figure 1 clearly accomplishes this. Any segment can be taken for detailed analysis without losing sight of the role it played in the overall interview.

A second constraint was to segment the interview in ways that attended to a potential "folk segmentation" of the same material. We feel that we have made a plausible case that Figure 1 does this, though we have not done what in principle would be a straightforward ethnographic elicitation task to check it out. Usually there are striking major shifts in content that clearly signal segment boundaries. As shown in the discussion of this interview, boundaries are not always so clear, and some segments—especially those that "slide" around—may have edges with no center. However, the slides were shown to be indications that Jack was developing a plan rather than instantiating it.

The third constraint set out in the introduction suggested that the analysis of ethnographic interviews should facilitate making inferences from the text to the knowledge necessary for the ethnographer (and his/her audience) to understand it. We noted above that segments seem to break around major shifts in content. Our continuing research is guided by a working assumption that these content shifts not only signal organizational units of the interview, but also organizational units of the knowledge Jack draws on to produce it. In other words, an interview segment points to the construction of schemas needed to understand it.

This assumption is in the spirit of the working assumption of cognitive anthropology—namely that units of language are publicly available pointers to the background knowledge necessary for their interpretation. The difference is that, traditionally, lexemes and categories have been the focus, whereas here we deal with interviews and schemas. Though the assumption builds on earlier work, it is at the same time broader and richer in the kinds of data it approaches and the kinds of inferences it aspires to. However, our purpose in this article has been to set out a general approach to the interview, not to conduct the full interpretation of it.

In short, the application of planning to ethnographic interviews

fits the three constraints on their analysis discussed in the introduction of this article. It suggests a way to approach what has always been one of the core problems of the ethnographer—the making sense of data whose form and content are primarily under the control of an informant rather than a social science researcher. At the same time, the exercise also shows some of the modifications in AI planning that are required for its use in developing a theoretical language for ethnography.

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