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ABSTRACT
               A study of collaboration and the ongoing negotiation
of authority in police helicopter work focused on inflight
communication in one helicopter during two weeks of operation. Data
were drawn from audio and video recordings of internal and external
communications obtained inflight and from observation and
physiological indicators of stress and workload. The factors observed
included the official relationship of the crew members, the physical
organization of the task and setting, the organization of information
available to the subjects, the social organization of the work
setting, and the collaborative nature of the work. Language use
aspects examined included evidence of crew hierarchy, teasing, rates
of initiation of non-operationally relevant new topics by each crew
member, mitigation levels, and requests for information. Analysis of
the data suggested that while there was evidence of the social
hierarchy in the helicopter, the language of the speakers was not
entirely predictable by their positions in that hierarchy, but
reflected momentary changes in their relation to each other, dictated
by changes in the task situation. Implications for other
collaborative work settings were found in these results, and further
research on authority negotiation in collaborative work settings was
recommended. (MSE)

WHO'S IN CHARGE HERE?: COOPERATIVE WORK
AND AUTHORITY NEGOTIATION IN POLICE HELICOPTER MISSIONS

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1. Introduction

It is widely believed that in most work organizations, at least
most well functioning organizations, the status of participants
is fixed, usually in a hierarchical pattern. In this very common
model, an organizational chart is considered to be as useful, as
real, and as unproblematic as a circuit diagram. The purpose of
this paper is to bring this assumption into question, by
examining a cooperative work situation in which the authority
status of the two participants is subject to a moment to moment
negotiation, on the basis of whose task is most immediately
salient, who has the knowledge to direct that task, the
distribution of information resources, and the organization of
the physical space. This negotiation is not, as conventional
wisdom would predict, disruptive to successful completion of the
task, but rather functions as a normal, unremarked background
condition of ongoing daily operations. Further, it is suggested
that this type of negotiation is not peculiar to this situation,
but is a common and important part of all collaborative work.
Finally, the understanding of the ongoing negotiation of
authority is relevant not only to the understanding of current
work situations, but is extremely important for the design of
automated systems which are intended to augment or replace the
activities of one or more participants in a complex work setting.

2. The Field Setting

The present study uses as data audio and video recordings
obtained inflight during two weeks of operation of an airborne
law enforcement agency. The aircraft is a Bell Long Ranger
helicopter, which carries a flight crew of two: a pilot, who is
the aircraft commander, and a flight officer, who is the mission
commander. Pilots are generally former military pilots, who have
received police training. Flight officers are police officers
who have received paramedic training, but are not trained as
pilots. Note that unlike most military and commercial aviation
operations, this situation involves two parallel hierarchies of
command rather than a single hierarchy. The pilot is responsible
for all decisions include operation of the aircraft, and aircraft
safety. The flight officer is in charge of the actual police
mission. Typical missions include search and rescue, emergency

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medical services, suspect pursuit, fire spotting, transportation
of personnel to crime or disaster sites, etc.

Several weeks of day and night operations were recorded using a
stationary-mount video camera focused to show the backs of the
heads of the crew members, the cockpit panel, and some of the
crewmembers' view out the windshield. In addition, a voice
recording system recorded both internal and external
communications directly from the officers' communication lines,
although only internal communications are analyzed in this study..
In addition, subjective ratings and physiological (heart rate)
measures were taken, to evaluate the effects of stress and
workload on crewmembers.

This research site is of interest for a number of reasons. One
is that although there are only two participants during each
flight, the social structure is actually quite complex, and
changes from moment to moment, depending on the nature of the
task in focus. This provides an important contrast to situations
previously investigated, such as commercial aviation crews (Linde
and Goguen (1983), Linde (1988)). These crews have a much
simpler, traditionally hierarchical structure. Additionally, the
current situation provides a valuable site for the study of the
nature of cooperative work, since the task demands vary widely in
nature, predictability, and difficulty, and within a single
mission, can range from so high that all the crewmembers'
attention and capacity is required, to so low that that long
periods of free conversation are possible.

This paper is based on investigation of the nature of cooperative
work in four missions, but uses as its major example one short ,
successful mission in which an extremely high degree of
collaborative effort is required. This mission, Flight 8, is a
day shift mission, lasting from 1:05 to 1:37 p.m. The crew
members had flown one mission previously during that shift, that
lasted from 8:40 to 11:30 a.m.. The mission investigated was a
response to a robbery of a VCR with a concealed micro-
transmitter. The helicopter task was to use an on-board
tracking device to follow the signal of the micro-transmitter,
find the car with a path that matched the signal, establish the
location of the car, and direct ground units to the car. This is
an impressive array of task demands, especially since the
crewmembers and ground units did indeed accomplish this mission
successfully. This mission is additionally interesting because
the flight officer, whose responsibility it is to direct the
tracking task, was not familiar with the operation of the
tracking device, since he had been filling a desk job for a year,
and had just returned to flight duty. Therefore, the pilot had
the additional responsibility of tutoring the flight officer on
the operation of the tracking device in real time, as they
attempted to carry out their actual mission. It is striking that
the pilot was able to accomplish this potentially socially
disruptive task with great skill, while continuing to fly the
aircraft in a heavily trafficked air space. Three other
missions, which involve performance of a variety of more routine

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police missions, are studied as well, to provide a contrast to this unusual situation.

3. The Organization of the Task

3.1 The Physical Organization

Let us consider the effect of the physical layout of the helicopter on the organization of collaborative work. The two participants normally sit side by side in the front of the cockpit, the pilot on the right and the flight officer on the left. (The exception to this comes when they have picked up a victim of an accident or illness who must be transported on a stretcher. The stretcher is placed on the left side of the cockpit and extends into the front. When a stretcher is place, the flight officer moves to a seat in back of pilot, which has a duplicate set of radios for him to use.) Each crewmember has a view out the windshield, and the window in the door on his side. The space of the cockpit is small, filled to capacity with equipment, and densely used. Each crewmember has the controls for his radio in front of him, and stores his written materials on his side of the cockpit. However, the nature of the search task often requires joint use of maps, which means a shared use of physical space.

3.2 Organization of Information

The different information available to each crewmember also forms an important part of the structure of the collaborative work of this task. As discussed above, the two participants have had different specialist training, and therefore have different bodies of information available to them. Additionally, each crewmember has the task of monitoring a different set of radio frequencies: the pilot communicates with air traffic control agencies, the flight officer with police dispatch and other law enforcement and public safety agencies. The radios are set up so that each crew member may monitor several frequencies. Commonly the pilot will have the police dispatch frequency tuned in as a secondary channel and will give it some attention, but still depends on the flight officer to monitor it authoritatively, and will check what he thought he heard on that channel with the flight officer.

The flight officer also has street maps and topographical maps of the area, and it is his task to identify the area over which they fly, and match streets and landmarks to named locations on the map. This task frequently becomes collaborative, with both crewmembers consulting the map and attempting to match it to what they see.

3.3 Social Organization

In order to show the operation of authority negotiation, we must first determine what the social organization is in this situation. As is extremely common in almost all social

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structures, there is an official and an unofficial organization. (This is a familiar distinction in ethnography. First people tell you how things work, and then, after hours, or days or years, if a good rapport has been established, they will tell you, or it will become evident how things *really* work.) In this law enforcement agency, officially, the two-man crew consists of two equals, both policemen, who both hold the rank of officer. As mentioned above, the pilot is the aircraft commander, responsible for the safe operation of the mission, while the flight officer is the mission commander, responsible for the completion of the police mission. This should, and in some respects does, mean that there are two hierarchies of command, either one of which may become salient depending on the demands of the moment. That is, piloting the aircraft or executing the police mission may be driving the crew's behavior at any moment, and thus may determine who has the right to give orders.

However, in practice, there are a number of types of evidence which show that in a situation in which there are no overriding task demands, the pilot tends to be treated as the commander, and the flight officer as the subordinate. Perhaps most importantly, while both crew members are paid more than ground-based officers, the pilot's supplement is higher. Thus, the pilot receives additional skill pay of 17% of his base salary, while the flight officer receives 5%. This is important evidence, since in American society it is axiomatic that rank, importance, and pay co-vary. (Historically, this difference dates from a period in which the pilot, of course, had training and skills as a pilot, but the flight officer had no additional training. Although flight officers now receive paramedic training, the difference in rate of skill pay has not changed.)

Another indicator that the two positions are not equal is the nature and direction of teasing and banter. In this social situation, teasing and banter are quite frequent, particularly because crewmembers can spend a great deal of time together at headquarters, waiting to be called out on a flight. A study was conducted of teasing, in which I wrote down all instances of teasing I heard during the second half of the study. (Note that the presence of an investigator, particularly a female investigator, is likely to have had an influence on the type of language used in teasing, and on the subjects of teasing. However, there is no reason why it should effect the direction of teasing.) I found that in this situation, teasing is almost always initiated by the superior. The subordinate may then tease back, but does not initiate a teasing round. This claim may appear to be circular, since the relative ranking of the pilot and the flight officer is the point at issue. However, the situation is clear in cases in which the sergeant is present, since he is officially and in fact the superior of everyone else present. It is always the sergeant who initiates any teasing round in which he is involved. Since we also see that in a teasing round between pilots and flight officers, it is the pilots who initiate the teasing, we may conclude that this is another sign of their rank relative to the flight officers.

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Some examples are given below.

1. [FO is putting creamer in coffee, Sergeant is
    watching]
    S: Why don't you drink your coffee like a man?
    FO: How about just chewing on some coffee beans?

2. [Pilot and FO are discussing Vitalogs. P is wearing
    it in leg pocket, wires coming out fly end of flight
    suit zipper, FO is wearing it in breast pocket, wires
    coming out of top end of flight suit zipper.]
    P -> FO: You look ridiculous.
    FO -> P: You look [Points, laughs]

An additional observation about the direction of teasing which
supports the observation that the pilot is taken as the superior
is that while flight officers are teased about poor performance
of their jobs, we have not observed this kind of teasing of
pilots. While it is understandable that flight officers would
not care to question, even in jest, the competence of the pilots
with whom they fly, this taboo itself creates a ranking of the
two positions.

A further type of social evidence for the higher rank of the
pilot is that pilots tend to make decisions for both parties. A
common type of decision occurs when there have been no calls for
the helicopter. The crew members have the right to decide to go
out on patrol, and they may do so if they have not yet flown a
sufficient number of hours on their shift that day. The question
about whether to make this decision is always initiated by the
pilot, and we have not seen any instances of flight officers
refusing this suggestion. (Note that pilots occasionally may
refuse to answer calls, if they consider that they are too
fatigued to fly safely.) Similarly, it is the pilot who decides
when to conclude a mission.

Finally, we may note the interaction of the two crew members in
terms of conversational management. During periods with a high
workload, of course, the conversation is managed essentially by
the demands of the task. This often includes, most saliently,
near-continuous transmissions by both crew members on a number of
radio frequencies. However, during periods when the workload is
lower, for example, when the mission is completed, during the
return flight to base, non-operationally relevant, social
conversation does happen. Such conversation is not continuous;
it is sporadic, interrupted both by radio transmissions, and by
interspersed periods of silence. One common way to start
conversations in this situation is to use "noticings", a form of
conversational opening in which one party draws the attention of
the other to some feature of the landscape as a potential
conversational topic. (Moerman 1988) Examples of such
initiations of non-operationally relevant conversation, all of
which follow a significant period of silence, are given in (3)
through (5). (3) is a noticing, (4) is a resumption of a topic
initiated before the flight, and (5) is a non-operationally

relevant comment on a police mission just completed.

3.   FO: This reservoir or lake or whatever looks pretty
         full, huh?
     P: Yep

4.   P: So you gonna uh look for another car or try to get
         that one fixed?

5.   P: That guy was kinda calm and cool for havin' just
         ripped down somebody.

     FO: Oh yeah

     P: Must be on drugs

     FO: Just dancin' around ya' know out there in broad
         daylight

     P: Drugs or crazy.

Noticings and initiations of non-operationally relevant new
topics are more frequently initiated by the pilot than by the
flight officer, as shown in Table 1.

Table 1: Initiation of New Topics

	Pilot	Flight Officer
Flight 6	15	8
Flight 8	3	1
Flight 10	1	1
Flight 12	8	2
Total	27	12

[Chi square = 5.03, df = 1, p = .02]

There is an operational explanation for this difference: although
the police mission may be completed, the pilot still has the
responsibility for safe operation of the aircraft as they return
to base. Therefore, he can decide, more easily than can the
flight officer, whether conversation is safe or desirable at any
moment. This fact, though, tends to give additional authority to
the pilot; not only does he control the aircraft, he may control
the intra-cockpit interaction as well.

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We may conclude that, all other things being equal, the unofficial authority structure ranks the pilot higher than the flight officer. However, as we will see, at any moment, this may change given the immediate demands of the task.

4. Collaborative nature of the work

4.1. The Task

Let us now consider the nature of the task for the main mission studied here. Before leaving headquarters, the crewmembers have been told that there has been a theft of a VCR with a concealed microtransmitter, and that the suspects have escaped in a black over gold Datsun. Their task is to fly to the area, get a signal on the tracker, match the movement of the signal to a car which also matches the description, identify the location of the car, and direct ground units to the car. None of the these tasks is trivial. The description of the car which they have received may be only partially correct, or entirely incorrect. (The information given by witnesses is often unreliable, a fact which which experienced police officers of course know. Therefore, they will tend to respond to cars or suspects that match only one of many attributes that have been reported. (Rubenstein 1973)) In this case, the car is reported to be a black over gold Datsun, and proves to be a gold Pinto.

Also, it is difficult to match the track of the lighted indicator dot on the tracker to the track of a car, particularly since in certain conditions, the signal lags behind the motion of the car being tracked. (6) contains the pilot's explanation to the flight officer of how the device works, a rather detailed explanation which he gives after the mission, on the return to headquarters

6. P: Oh yeah. The uh when it's doin' all that jumpin' around shit. (FO 'Yeah) You kinda generally steer it that way until you get that solid buzz and a good light. And it's kind of a guessing game until you get a real good strong signal on it and then once you get on the signal you start goin' around, you look and try to find a car that's going the same direction you're goin'. We were on that gold car twice. The gold car would turn and go this way and it would still show straight until we got maybe abeam the corner and then it would start comin' around.

Once the crew has identified a car whose track matches the track of the signal, it is still a nontrivial task to ascertain its location; the flight officer uses street maps and attempts to use landmarks to match what he sees, from a height of about 500 feet, with locations on the map. Finally, ground cars must be directed in such a way as to keep them out of the potential line of fire from the suspected car.

4.2 Requirements for Collaboration

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There are a number of ways in which the two crewmembers are required to collaborate to accomplish this task. First, and most obvious is the geographical location task. The flight officer must determine the area to be searched from police dispatch on the radio, and relay this information to the pilot. At the pilot's request, he may also inform the pilot of the area over which they are flying, or may consult maps to determine the identity of the streets below them.

Identification of the suspected vehicle is also, of necessity, a collaborative task, since, as discussed above, neither crew member has a full view of the ground. Although tracking the vehicle is formally the flight officer's job, because of the need to get as full a view as possible, the pilot must also participate. This task requires a great deal of pointing, often with gestures that impinge into the other crewmember's space or touch his body. Additionally, the pilot must be aware of the general direction of any vehicle the flight officer is tracking, in order to position the aircraft in the most helpful way.

Finally, identification of the location of the suspected vehicle may be a collaborative task, as only one crewmember may be able to identify a street or location, based on his local knowledge of the area. (7) gives an example of this type of collaboration.

7. FO: Where are we at Mike?

    P: Let's see that was Stockton Boulevard and we're about two blocks south of whatever uh that street the OJ's on. S- Stockton approaching Fruitridge say.

(Note that part of the ongoing task for these crewmembers is updating of spatial knowledge. During periods of low workload, a common topic of conversation is the identification of landmarks, buildings and terrain features, and changes in them.)

5. Effects of Negotiation on Linguistic Structure

In studying the social nature of ongoing collaboration, one extremely sensitive indicator is linguistic marking of politeness and indirection. This variable, termed mitigation, is defined by (Labov and Fanshel 1977): those linguistic devices which serve to make an utterance less direct, more polite, and less likely to cause offense. In this data, utterances are distinguished as high mitigated, low mitigated, or direct. (A value of aggravated is also distinguishable, but there are no instances in this data set.)

High Mitigation

8. P: Say I would get a map out Dave. Of this area.

9. FO: Well you want to widen out just a little bit.

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10. [FO: Why don't we go uh
    P: Out to that creek?]
    F: Yeah I was going to say out maybe to the creek or
          even kind of the, not the the bridge line, but up
          in there a little ways, maybe kind of work back.

        Low Mitigation

11. P: OK did they have a vehicle description?
    [Mitigated way to get the flight officer to request a
    vehicle description.]

12. FO: You don't follow the light then?
    [Mitigated form of direct request for information: "Do
    you follow the light?" Compare example 16.]

13. P: That's a good reading now. When you get a constant?

14. FO: I wonder if they have canine units up here.
    [Mitigated form of direct request for information: "Find
    out if they have canine units up there" Compare example
    16.]

    Direct

15. P: Direct that unit toward the gold car.

16: FO: Does it always bounce around like that?

As these examples show, there are many linguistic devices which
function as mitigators: questions are more mitigating than
imperatives; modal auxiliaries are more mitigating than simple
verb forms; past tense forms where a present tense could be used
are mitigating; negative questions are more mitigating than
positive questions. This list could be continued almost
indefinitely. A theory of why so many and such heterogeneous
devices should all serve a similar social function has been given
by (Brown and Levinson 1979). This account is based on the notion
that politeness is the attempt to avoid **face threatening action**,
where **face** is the public self-image that every member of the
culture wants to claim for him/herself. There are two types of
face, negative and positive. **Negative face** is "the basic claim
to territories, personal reserves, rights to non-distraction --
i.e. to freedom of action and freedom from imposition." Positive
face is the "positive consistent self-image or 'personality'
(crucially including the desire that this self-image be
appreciated and approved of) claimed by interactants." (p. 66)
These two types of face give rise to two types of politeness,
also called negative and positive. **Negative politeness** attempts
to minimize the degree of trespass to the addressee's autonomy;
positive politeness attempts to minimize the distance between
speaker and addressee, so that the speaker's and addressee's
desires appear to be the same.

In order to subject the use of mitigation to a quantitative analysis, it is necessary to devise a scale to quantify degrees of mitigation. We use a four-point scale: Aggravated, Direct, Low Mitigated, and High Mitigated. Direct utterances are assigned a value of 0, low mitigated utterances a value of 1, high mitigated utterances a value of 2, and aggravated utterances, (which are not present in this data), a value of -1. This scale has been empirically validated as conforming to the intuitions of the aviation community. That is, a reliability study was conducted, comparing sample utterance ratings of professional to ratings by the investigators, and found that the two sets of ratings were correlated at an 80% level. This study is described more fully in Linde and Goguen (1983).

Previous research (Linde and Goguen, 1983; Linde, 1988, Linde *et al* 1987) suggest that utterances going up the chain of command tend to be mitigated, while those going down the chain of command tend to be direct. Although this pattern has been found in situations such as commercial aviation crews, which have a strict and simple chain of command, it is not true in the case of the police helicopter crews, which have, as we have shown, a more complex situation of parallel hierarchy. Table 2 shows the mitigation scores for crew members in the four crews investigated. The mitigation score is computed by adding the numbers of Direct, Low mitigated, and High Mitigated utterances multiplied by 0, 1, and 2 respectively, and diving by the total number of utterances. Although the Flight Officers do have mitigation scores slightly higher than those of the Pilots, the difference is not statistically significant.

Table 2: Mitigation Scores of Crew Members, 4 Flights

Speaker	D	LM	HM	Mitigation Score
Pilots	47	39	3	.50
Flight Officers	55	43	7	.52

However, as we shall see, although mitigation is not used to mark stable hierarchical structure in this situation, it is used to mark negotiations of who is immediately in charge in a given situation. As we have seen, there are two parallel authority structures, defined by the task demands of the moment. The pilot is the aircraft commander, while the flight officer is the mission commander, and at any moment, the demands of one of these these aspects of the total mission may be most salient. Therefore, at any given time, a crew member may need to make a request of the other -- either to perform some action, or to ascertain or transmit some information. A request may be categorized by its task ownership -- an action needed for the

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performance of the speaker's task, or for the performance of the addressee's. As we shall see, these have a very different social status, depending on whether one crewmember is telling the other how to do his own task, or requesting some action which he himself needs for his performance.

In the present investigation, we consider all requests, including requests for action, and requests for information. Requests for information may be, indirectly, requests for action, if the addressee does not have the requested information, and must perform an action to obtain it. We may further subdivide requests into requests pertaining to the speaker's primary responsibility, those pertaining to the addressee's primary responsibility, those pertaining to mutual responsibilities, that is, responsibilities of the entire mission, and those pertaining to no responsibility, that is, requests involving non-operationally relevant topics. We find that crew members are extremely sensitive to the nature of task demands: requests involving the speaker's own mission tend to be quite direct, while those involving the addressee's mission, tend to be significantly more indirect. This finding is quite understandable: requesting someone to perform his own task is potentially more face-threatening than requesting him to perform some action needed for one's own task. Note that in general, it is the pilot's task to pilot the aircraft, and it is the flight officer's task to identify people, cars, and places on the ground and to communicate with the police dispatcher. It is both crewmembers' task to find streets and major landmarks. (17) through (25) are examples of the range of direct, low mitigated, and high mitigated requests for tasks owned by the speaker and addressee. Task owned by both crewmembers or neither are not considered in this investigation, since they do not play a part in authority negotiations.

Direct -- Speaker's Task

17. FO: Did you see anything leave?

18. FO: Turn a light on.

Direct -- Addressee's Task

19. P: Do you see him?

20. FO: Come in a little closer right about at an angle like this.

Low Mitigated -- Speaker's Task

21. FO: See there you go again. [Pointing to tracking device]

22. FO: You don't follow the light then?

Low Mitigated -- Addressee's Task

23. P: So that's Kirby. Right there right?

24. P: I wonder if this high school parking lot would have
       anything though?

High Mitigated -- Addressee's Task

25. FO: We should monitor that um county fire if you don't
        mind.

Table 3 shows the comparison between speaker-oriented requests
and addressee-oriented requests.

Table 3: Mitigation Level By Task Orientation

Task Ownership	D	LM	HM	Mitigation Score
Speaker	15	7	1	.39
Addressee	24	33	6	.71

[Chi square = 17.67, df = 1, p = .00002]

These results suggest that speakers' language is not wholly
predictable by their position in a long-term social hierarchy.
Rather, we see that momentary changes in their relation to one
another, dictated by changes in the task situation, also affect
their linguistic choices.

6.   Implications for other work settings

It might be argued that this is an extremely unusual situation,
with no implications for other work settings that are organized
in a more conventional hierarchical structure. However, I would
argue that in fact this situation is unusual only in that the
official account of status is that the two crewmembers are
equals, while the informal ranking is not. In many, if not all
work settings, there are formal hierarchies of authority,
hierarchies of task knowledge, hierarchies of seniority and
historical information, hierarchies of access to information and
gossip, etc. At any moment, any one of these forms of ranking
may become most salient, or may be negotiated to become most
salient, and thus the relative status of participants may change.
Additionally, of course, all of these forms of relative ranking
may be manipulated by participants in order to attempt to improve
their long-term standing, or other factors of their work
situation.

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We may take as another example a study of small group planning, using the Watergate tapes as data (Linde and Goguen 1978). In this situation, the formal hierarchical ranking of President Nixon and his advisors is extremely well-structured and clear. Although subordinates of course attempted to improve their own standing, as many of their memoirs testify ((Dean 1979), (Magruder 1974)), this type of negotiation was less common in formal meetings with the president than it was in informal smaller meetings. The president's management style in formal planning meetings also tended to encourage the emergence of task driven authority. His practice was to allow subordinates to prepare and present a complete or nearly complete plan before beginning to criticize or alter it. In this management style, during the period when a subordinate presents a draft plan, he has the floor, and so has a certain amount of control over the flow of planning, even though in terms of a formal organization chart, he may be the most junior person present. This type of discourse status of rights to the floor has only recently begun to be studied in detail (Tannen 1984)) but it is clearly relevant to the organization of collaborative work.

Further studies of a variety of work settings are necessary, in order to determine the extent and types of authority negotiation present, and their relation to collaborative work. The present study should serve to indicate the existence of this phenomenon, and its importance to the understanding of the nature of work. This is particularly relevant to the design of automated systems intended either to aid participants, or to replace some of them. For example, there is a great deal of interest in the area of aircraft design in the development of the automated cockpit, which would replace one crew member with an AI system. All proposals for such systems assume that the work of the crewmembers is partitioned and separate, and therefore, automating the work of a single crewmember will make it possible to replace him.[1] This takes no account of the highly collaborative nature of the work, as this paper demonstrates. It is important for system designers to realize that crewmembers are not in fact isolated units performing isolated task elements, but rather are in constant and intense communication and co-creation of their tasks and their knowledge of the world. Furthermore, any system design which assumes a fixed hierarchy either of participants or of task types will inevitably fall short of the actual complexity of the nature of this type of work.

Notes

1. The immediate interest in helicopter automation is in the area of military rather than civilian helicopters. However, the same kinds of collaboration we have found in civilian law enforcement missions are present in certain types of military missions, and therefore the same issues of system design are relevant. (See Linde and Shively, to appear.)

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References

Brown, Penelope, and Levinson, Stephen. 1979. Universals in language: Politeness phenomena. Questions and Politeness: Strategies in Social Interaction, ed by Esther N. Goody. 56-289 Cambridge University Press.

Dean, John. 1979. Blind Ambition. Pocket Books.

Labov, William, and Fanshel, David. 1977. Therapeutic Discourse: Psychotherapy as Conversation. Academic Press.

Linde, Charlotte, and Goguen, Joseph. 1978. The structure of planning discourse. Journal of Social and Biological Structures, Volume 1, pp 219 -- 251.

Linde, Charlotte and Goguen, Joseph. 1983. Linguistic Methodology for the Analysis of Aviation Accidents. NASA Contractor Report 3741.

Linde, Charlotte. 1988. The quantitative study of communicative success: Politeness and accidents in Aviation Discourse. Language and Society, Volume 17, Number 3.

Linde, Charlotte, Goguen, Joseph, Finnie, Elisa, MacKaye, Susannah, and Wescoat, Michael. 1987. Rank and status in the cockpit: Some linguistic consequences of crossed hierarchies. Variation in Language: NWAV-XV at Stanford: Proceedings of the Fifteenth Annual Conference on New Ways of Analyzing Variation. Ed. by Keith M. Denning, Sharon Inkelas, Faye C. McNair-Knox and John Rickford. Department of Linguistics, Stanford University.

Linde, Charlotte and Robert J. Shively. To appear. Field Study of Communications and Workload in Police Helicopters: Implications for AI Cockpit Design. Proceedings of the Human Factors Society 1989 Meeting.

Magruder, Jeb Stuart. 1974. An American Life. Athenaeum.

Moerman, Michael. 1988. Talking Culture: Ethrography and Conversation Analysis. University of Pennsylvania Press.

Rubenstein, Jonathan. 1973. City Police. Farrar, Straus and Giroux.

Tannen, Deborah. 1984. Conversational Style: Analyzing Talk Among Friends. Ablex Publishing Corporation.