PROTOCOL ANALYSIS: A CRITICISM

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This study presents and discusses research collected from the thinking aloud protocols of Freshman writers. The research employs the method, "protocol analysis," used by Linda Flower and John Hayes in "The Cognition of Discovery: Defining a Rhetorical Problem" (1980). Thinking aloud protocols' aim is to capture a detailed record of what is going on in the writer's mind during the act of composing itself (Flower, Hayes, 1981). A protocol is as Carol Berkenkotter states in "Understanding a Writer's Awareness of Audience" (1981): "a rich source for information about some of what the writer is thinking as she is writing." This study focuses on how student writers perceive the task. Our focus is on the task, not the process. In addition, we are using a larger number of subjects than other protocol researchers have used and dividing them into two groups--competent and incompetent writers. The study also minimizes one of the less favorable criticisms of protocol analysis, that the controlled laboratory situations of Flower and Hayes were unnatural working conditions for writers (Voss, 1983). Our informants worked on the assignments where they would normally work, at home, in a dorm room, etc. We asked them to work on the task as they normally would have--thinking, writing--except they must try to think (compose) aloud onto a tape recorder. They were asked to verbalize everything that went through their minds as they worked. Coders then listened to the tapes to determine when and how frequently the writer referred to any of six prescribed task levels: assignment, content, persona, audience, language, and process, and to discern to what extent these task references differed or were similar in competent and incompetent writers. We assumed:

1. Differences between good and poor writers can be measured.
2. Protocol analysis is an honest and useful measurement of these differences.
3. Protocol parallels actual composing process.
4. Protocol is valid.

5. All writers, being first quarter freshmen, began in the same place.

To see whether competent students engaged task differently than incompetent students, task references recorded on the tapes were coded to the fullest written draft according to the six task levels. Many composition theorists and practitioners expect the student to address the four aspects. Further, they form the discourse triangle, a well accepted diagram of the essentials of composing (Kinneavy, Moffett, Britton). Thus, we can expect that a student writer who addresses a writing task successfully must, consciously or unconsciously, view and review the task from each of these discourse perspectives. Moreover, we knew from experience that student writers refer again and again to the assignment, in general, rereading it, as a way of keeping on task and promoting the generation of ideas. Finally, after listening to several tapes, we clearly heard the students including as part of the perceived task instructions or commentary directed to the researchers. Usually, this commentary described the student's writing process in some way. Because this occurred frequently, we included the student's reference to the ongoing writing process as a perspective on the task. Thus, we defined six aspects of the task (See Appendix, Table 1).

We asked the students to complete four assignments. The assignments varied in difficulty and were presented in the order least to most difficult. Each specified the aim, audience, persona, context and/or formal constraints (See Appendix for assignments). The order of presentation was: application, letter, review, and defense. The students did the work at their leisure, at the rate of one assignment per week for four weeks. When the students returned the packet for one assignment, they received the next assignment packet. In each packet were the general instructions, the specific assignment, together with necessary related materials, and a blank 180 minute cassette tape. Each assignment required a different type of writing, but all invited students to engage the first five of the six perspectives. Perspective six, process, while interesting, was non-assigned

perspective. The students worked wherever and whenever they chose; these circumstances occasionally interfered with seriously addressing the task. But we wanted students to write under their usual constraints in their usual setting.

Each of the three coders listened to each tape while reading/following the student's writing. The fullest draft was read to correspond with the appropriate portions of the tape and taped task references marked to correspond with the text. Coders worked separately initially, then relistened to resolve discrepancies. If a discrepancy could not be resolved, it was not included in the count.

RESULTS - A total of fourteen writers' composing processes in four separate writing assignments were included in this analysis. The total task references by students in all four assignments reveal C writers refer more often to assignment, content, and language, with a slight advantage in process, than do the I writers. The I writers had the advantage in persona and audience but both groups' referral to these tasks is minimal. (See Appendix, Table 2.)

TASK REFERRALS

ASSIGNMENT (Referral #1) - The I students referred back to the assignment an average of 3.11 times, while C students did so 4.0 times. In fact, 3 of the 7 I students never referred back to the assignment in any of the four assignments; whereas, only one of the C students never referred back to the assignment. Thus, four of the I students account for all the referrals back to the assignment. Six of the C students referred back to assignment at least twice during the writing of four assignments. The average referral difference between I and C was .89, favoring the C group.

CONTENT (Referral #2) - Generally, the students in both groups reread or referred back to the assignment to consider content. I students did this an average of 6.57 times, C students an average of 9.57 times over four writing assignments. Only one of the I students never refers to content while all of the C students refer to this task at least once. The average referral

difference between I and C groups was 3.00, favoring group C.

PERSONA AND AUDIENCE (Referral #'s 3 and 4) - Neither group considers with any regularity persona or audience. The average referral difference between I and C groups was .29 for persona and .15 for audience, favoring group I in both cases.

LANGUAGE (Referral #5) - All students in each group are concerned with the language aspect of task. I students refer to language aspects an average of 8.29 times over four writing assignments, C students 9.42 times. The average referral difference between I and C groups was 1.13, favoring C.

PROCESS (Referral # 6) - All students in each group state their awareness of process, either acknowledging the writing process as they are engaging in it or expressing their concern about what we the researchers expect of them. I students refer to process 8.57 times in four assignments, C students 9.0 times. The average referral difference to process was .43, favoring the C group.

Subsequent analysis was based on total referrals to task within each writing assignment, by group (See Appendix, Table 3). By assignment, student references to the six aspects of task appear roughly similar with the overall pattern.

ASSIGNMENT #1 - APPLICATION

Both I and C groups refer similarly to assignment (5 times each) and audience (0 times each). Both refer little to persona (I = 2, C = 0), while both refer often to language (I = 24, C = 28). In content (I = 26, C = 17) and process (I = 33, C = 21), the I group refers more often than C. Of all six tasks, the I group refers to process (33 times) and the C group to language (28 times) most often. The references for both groups concentrate on content, language, process; the C group is more aware of the language aspect of task than the I group. And the I group stresses process more than any other task. Neither group attends to audience.

ASSIGNMENT #2 - LETTER

Both I and C groups refer little to persona (1 time each) and audience (I = 2, C = 0). In all remaining task references,

the C group refers more often than the I group to assignment (I = 2, C = 6), content (I = 19, C = 25), language (I = 21, C = 27), and process (I = 21, C = 27). Here once again both groups seem to stress content, language and process with the C group stressing all three more often than the I group.

ASSIGNMENT #3 - REVIEW

Both I and C groups refer 0 times to persona and audience. In assignment (I = 8, C = 11), language (I = 13, C = 15), and process (I = 8, C = 11), the C group refers slightly more often than the I group. The C group refers much more often to content (I = 2, C = 12). Of all six tasks, both the I group (13 times) and the C group (15 times) refer to language most often. This assignment shows the clearest differences between the two groups. The I students approach tasks fewer times and from fewer perspectives than the C students. However, both disregard persona and audience.

ASSIGNMENT #4 - DEFENSE

Both I and C groups refer to persona and audience 0 times. Both groups were similar in reference to assignment (I = 7, C = 6). In process, the C group refers more often than the I group (I = 9, C = 13). In content and language, the C group refers more often (I = 3, C = 13) and (I = 0, C = 8) than the I group. Of all the task levels, the I group refers most often to process (9 times) and the C group refers most often to content and process (13 times each). In this assignment, more difficult than those which precede it, the I students engage task very little while the C students attempt to engage task in four aspects. Two I and two C students cease to participate at this level of complexity. Two of the I and two of the C's level of participation is limited to two task level references or less.

STATISTICAL RESULTS

On initial examination, the differences in task references seemed to indicate that the competent group did indeed refer more often to the defined tasks in four of the six tasks (assignment, content, language and process), with the remaining two tasks (persona and audience) rarely referred to by either

the competent or incompetent group. However, the average of the differences per student seemed to indicate an inconclusive difference in all four assignments and lead us to investigate a deeper statistical significance. None was forthcoming, which leads us to examine further the usefulness of protocol analysis in the natural setting.

With P equaling the degree of certitude for the error probability of our research hypothesis, we found negative results (See Tables 2 and 4). We assumed that Xi = Xc in their use of the task references we defined as needed to produce good prose. When we compared the two groups, we found P values all in excess of an acceptable significance level of $<.05$ which indicated there was a high likelihood we would be in error, concluding that our data said anything of consequence about the difference between competent and incompetent writers. We therefore, felt, based on these figures, there was not enough difference to conclude the present approach to protocol analysis is a reliable indicator of what task references demonstrate regarding competence in writing.

Before we resigned ourselves to this conclusion, we decided to make an adjustment in the arrangement of the members of the two groups, an admitted satistical no no. Our rationale was that the two members of the incompetent group designated as OM33 and OM34 considered themselves to be competent writers while their instructors assessed their writing abilities as incompetent. Because there seemed to be evidence in favor of the students' opinions, we thought we were justified in experimenting with the different arrangement of group members, by first excluding these two members from the study altogether (See Tables 5 and 6) and, second, testing to see the results of including them in the competent gorup (See Tables 7 and 8). However, we found no change of any consequence in either case.

While we do not argue that our study is without problems, we do not hesitate to confidently make certain observations and conjectures addressing the possible reasons for the lack of conclusive findings.

1. The process of clearly defining an adequate set of tasks and assessing the results of the subjects' processes seems too subjective and inexact to warrant a set of concrete conclusions.
2. Attempting to verbalize a thought process in writing is a poor reflection of the actual process a writer undergoes, especially as regards less competent writers who are often reluctant to commit to tape that which they recognize as inadequate or incompetent.
3. The highly personal nature of invention impedes the verbalization process, especially when the writer feels inadequate to the task as is often the case with incompetent writers. This makes for a restrained and inhibited verbalization on the part of the subject and, resultingly, inaccurate data.
4. While the restrictions of a laboratory setting lead to problems concerning a natural writing environment, allowing for a natural writing environment often leads to a lack of discipline regarding the assignment and an inaccurate reporting of process on the part of the writers. We cannot say which is the lesser of these two problems.

Obviously, we feel that the concept of analyzing the thought processes of competent writers and comparing them with those of incompetent writers to discover better methods of instruction is conceptually valid and has every potential of yielding fruitful results. Nonetheless, the main question facing this field of study is how to access these thought processes. Protocol analysis does not appear to be amenable to the natural setting. The results of our data would seem to indicate the process of protocol analysis is an impediment to a natural writing process or there would have been a much greater disparity between the average numbers of task references of the two groups. The future of protocol analysis will depend on finding more reliable methods of accurately reporting the subjects' writing process. The present methods are too conducive to the ambiguous results which our study produced.

Until such time as a better method for recording subjects' mental processes can be found, some general discoveries, conclusions, and implications, made during the course of our study, might aid to direct future work in protocol analysis.

DISCOVERIES AND CONCLUSIONS

1. Good writers and poor writers did not respond to all the tasks.
2. Of all the tasks, good and poor writers consistently referred least to persona and audience.
3. There were fewer references to task in both groups the more complicated the assignment.
4. Good writers revised more.
5. Good writers referred to deep structure (syntactical concerns) for revision while poor writers revised surface structure (semantic concerns).
6. Poor writers were tied to topic.
7. Poor writers never moved beyond sketchy representation of audience and assignment.
8. Good writers, by contrast, used re-examination to add to their image of audience and assignment.
9. Both groups' initial analysis of assignment and audience was unusually brief.
10. Both plunged into generating ideas but returned to consider assignment.
11. Poor writers returned to reread assignment, searching for ready-made goals, instead of forming their own.
12. Good writers returned to reread the assignment with a better sense of direction and definition of purpose than did the poor writers.
13. Poor writers were easily distracted and even sought distraction.
14. Good writers tended not to have or tried to get rid of distractions.

IMPLICATIONS

FOR TEACHERS

1. Students still see writing as a very narrow activity.
2. Students do not have a variety of perspectives to choose from. Students attempt to write to the anticipated teacher perspective.
3. We should not assume that "simple" assignments are simple. Many students, for example, did not know what constituted a review.
4. We must break down components of particular writing tasks for students. For example: What constitutes an argumentative or comparison contrast essay or a review?

FOR RESEARCH

1. We may compare the differences in range between the best (C) writer and the worst (I) writer as far as task is concerned. We think what we will see is more pronounced differences in specific students than in groups.
2. We may follow particular students (both C and I) through completed course work in Freshman Composition to compare levels of writing progress.
3. We may do a holistic analysis.
4. We may do a feature analysis.
5. We may do a primary trait analysis.

PROTOCOL EXCERPTS - Included here are samples of competent (Om28) and incompetent (Om18) writers' verbal protocol.

ASSIGNMENT: DEFENSE Informant Om18

All right. Um. I Henry Rothman and I Judy McQuinn agree to the terms set forth in this document. That'll be the first sentence. Obviously. Blah, blah first sentence and then the main issues here will. . . . No. Okay. Let's go to the car problem first. . . . I just want something that says, "I Henry." Okay. So then ah so then ah Mary has to pay . . . so I'll write up a rough draft. Okay. I got the heading now and I'm just going to say A. B. C. D. and at the end I'm gonna put a little conclusion

and that's gonna be it. Okay. So I just wrote this up. I said, I Henry Rothman and I Judy McQuinn agree to the terms set forth in this document. The $384.73 car repair bill is to be split. Judy will pay blah; Henry will pay blah. The $467.35 savings account will be split. Judy will pay blah; Henry will pay blah. Judy will receive the stereo; Judy will receive the puppy plus $100. Henry will receive the tv. Henry will receive the microwave. . . . That's it. I should have a big other page that says, explaining the rationale. (He reads the assignment again.) Oh, jeez. Oh. Produce some rationale, present the reasons for your decision. Your purpose in the rationale statement is to convince Henry . . . . Oh, that's what I got to do. I'll do that. Okay, I wrote this out on back. . . . That's it. That's it. I'm all done and it took me, it took me 33 minutes.

ASSIGNMENT: DEFENSE Informant Om28

Okay, I've read the case. . . . I'll start out the way Henry said to. . . I Henry Rothman and I Judy McQuinn agree to the terms set forth in this document. Okay, now I'm going to restate my decisions about their possessions. The car. I believe Henry should keep the car. That's fine. Sorry to entertain you with a little music there. Next door. That's not us. This is due to the fact that Henry owned it in the first place. Also Judy's driving probably okay. The money. Okay. . . . I believe this is a fair solution. . . . Just a lot of writing to do today. English paper. Communication's paper. Are you done? (She asks her roommate. Conversation ensues.) Okay. That's all for the settlement.

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Table 1

ASSIGNMENT	1.	Student refers directly back to the assignment. Example: Student reads or rereads the assignment or part of it, or refers by summary statement to assignment.
CONTENT	2.	Student stops to consider content in terms of assignment or in terms of last few words. Example: "What I want to do is . . . ." "What I need to say is . . . ."
PERSONA	3.	Student exhibits concern for how I sound (I-centered). Example: "I sound kind of wierd." "Nobody talks like this."
AUDIENCE	4.	Student exhibits concern for the audience (you-centered). Example: "She's a college student, so she probably . . . ." "What do they need to hear?"
LANGUAGE	5.	Student exhibits concern for language (word-centered). Example: "How does this sound?" "Nice place to live. no, 'nice apartment' sounds better."
PROCESS	6.	Student states her concern with the writing process as such. Example: "I'm going to proofread now." "Dr. Hoffman. I don't know if this is what you want." "Um. Writer's block.

Table 2

Totals of Task References In All Four Assignments By Student

Task #	1	2	3	4	5	6
Incompetents:						
On11	0	2	1	0	2	6
Om12	6	0	0	0	5	5
Om17	0	5	0	0	6	3
Om18	6	11	1	1	10	11
Om102	0	8	0	0	7	11
Om33	1	10	1	1	13	10
Om34	9	10	1	1	13	10
Totals	22	46	4	3	56	56
Competents:						
On20	2	3	0	0	3	6
On21	0	1	0	0	5	7
On27	4	4	0	0	5	7
On29	9	20	1	1	19	19
On201	4	22	0	0	4	6
Om28	4	8	0	0	21	13
Om203	5	9	0	0	4	6
Totals	28	67	1	1	65	63

Task Reference Averages

Task #	1	2	3	4	5	6
Incompetents:	3.14	6.57	.43	.29	8.29	8.57
Competents:	4.00	9.57	.14	.14	9.42	9.00
Differences:	.89	3.00	.29	-.15	1.13	.43

Table 3

Task References Totals According To Assignment - By Student And By Group

Task #	Application 1 2 3 4 5 6	Letter 1 2 3 4 5 6	Review 1 2 3 4 5 6	Defense 1 2 3 4 5 6
Incompetents:				
On11	0 2 1 0 2 4	0 0 0 0 0 0	0 0 0 0 0 1	0 0 0 0 0 1
Om12	0 0 0 0 1 1	1 0 0 0 4 3	4 0 0 0 0 1	1 0 0 0 0 0
Om17	0 5 0 0 2 3	0 4 0 0 4 0	0 0 0 0 0 0	0 0 0 0 0 0
Om18	1 5 0 0 3 7	1 3 1 1 5 1	2 2 0 0 0 2	2 1 0 0 0 3
Om102	0 1 0 0 6 5	0 5 0 0 1 3	0 0 0 0 0 0	0 2 0 0 0 3
Om33	0 6 0 0 5 5	0 4 0 0 4 5	1 0 0 0 6 4	0 0 0 0 0 0
Om34	4 7 1 0 5 8	0 3 0 1 3 0	1 0 0 0 7 0	4 0 0 0 0 2
Totals	5/26/2/0/24/33	* 2/19/1/2/21/12	* 8/2/0/0/13/8	* 7/3/0/0/0/9
Competents:				
On20	0 1 0 0 0 4	0 2 0 0 0 1	2 0 0 0 3 1	0 0 0 0 0 0
On21	0 1 0 0 3 1	0 0 0 0 2 4	0 0 0 0 0 0	0 0 0 0 0 2
On27	2 0 0 0 4 0	1 3 0 0 2 5	1 1 0 0 2 1	0 0 0 0 0 0
On29	1 6 0 0 0 9 6	1 4 1 0 1 6	5 5 0 0 4 5	2 5 0 0 5 2
On201	1 6 0 0 0 4 4	1 8 0 0 7 4	0 5 0 0 4 0	2 3 0 0 3 5
Om28	1 0 0 0 6 4	1 5 0 0 145	1 0 0 0 1 1	1 3 0 0 0 3
Om203	0 3 0 0 2 2	2 3 0 0 1 0	2 1 0 0 1 3	1 2 0 0 0 1
Totals	5/17/0/0/28/21	* 6/25/1/0/27/25	* 11/12/0/0/15/11	* 6/13/0/0/8/13

Table 4

Statistical Results of Table 2 by Task Reference

Task #1:	$\bar{X}i$ = 3.142857	Sdi = 3.760699
	$\bar{X}c$ = 4.000000	SDc = 2.768357
	T = .4856006	P = .6359959
Task #2:	$\bar{X}i$ = 6.571429	SDi = 4.314980
	$\bar{X}c$ = 9.571428	SDc = 8.303757
	T = .8481819	P = .4129353
Task #3	$\bar{X}i$ = .571429	SDi = .534523
	$\bar{X}c$ = .142857	SDc = .377965
	T = 1.732051	P = .1088643
Task #4	$\bar{X}i$ = .428571	SDi = .534523
	$\bar{X}c$ = .142857	SDc = .377965
	T = 1.154701	P = .27069
Task #5	$\bar{X}i$ = 8.000000	SDi = 4.163332
	$\bar{X}c$ = 8.714286	SDc = 7.761321
	T = .2145706	P = .8337053
Task #6	$\bar{X}i$ = 8.000000	SDi = 3.265987
	$\bar{X}c$ = 9.142857	SDc = 5.014266
	T = .505291	P = .6225067

Table 5

Totals of Task References In All Four Assignments With Om33 and Om34 Omitted From Both the Incompetent and the Competent Groups.

Task #	1	2	3	4	5	6
Incompetents:						
On11	0	2	1	0	2	6
Om12	6	0	0	0	5	5
Om17	0	5	0	0	6	3
Om18	6	11	1	1	10	11
Om102	0	8	0	0	7	11
Om33	Omitted					
Om34	Omitted					
Totals	12	26	2	1	30	36
Competents:						
On20	2	3	0	0	3	6
On21	0	1	0	0	5	7
On27	4	4	0	0	5	7
On29	9	20	1	1	19	19
On201	4	22	0	0	4	6
Om28	4	8	0	0	21	13
Om203	5	9	0	0	4	6
Totals	28	67	1	1	65	63

Task Reference Averages

Task #	1	2	3	4	5	6
Incompetents:	2.4	5.2	.4	.2	6.0	7.2
Competents:	4.00	9.57	.14	.14	9.42	9.00
Differences:	1.60	4.37	-.26	-.06	3.42	1.80

Table 6

Statistical Results of Table 5 by Task Reference

Task #1:	$\overline{X}i$ = 2.400000	SDi = 3.286336
	$\overline{X}c$ = 4.000000	SDc = 2.768857
	T = .9149154	P = .3817679
Task #2:	$\overline{X}i$ = 5.200000	SDi = 4.438468
	$\overline{X}c$ = 9.571428	SDc = 8.303757
	T = 1.063794	P = .3124353
Task #3	$\overline{X}i$ = .400000	SDi = .547723
	$\overline{X}c$ = .142857	SDc = .377965
	T = .9682459	P = .3557556
Task #4	$\overline{X}i$ = .200000	SDi = .447214
	$\overline{X}c$ = .142857	SDc = .377965
	T = .2397317	P = .8153806
Task #5	$\overline{X}i$ = 6.00000	SDi = 2.915476
	$\overline{X}c$ = 8.714286	SDc = 7.761321
	T = .7371655	P = .477961
Task #6	$\overline{X}i$ = 7.2000000	SDi = 3.633180
	$\overline{X}c$ = 9.142857	SDc = 5.014266
	T = .7352488	P = .4790767

Table 7

Totals of Task References In All Four Assignments With Om33 and Om34 in the Competent Group

Task #	1	2	3	4	5	6
Incompetents:						
On11	0	2	1	0	2	6
Om12	6	0	0	0	5	5
Om17	0	5	0	0	6	3
Om18	6	11	1	1	10	11
Om102	0	8	0	0	7	11
Om33	Included in Competent Group					
Om34	Included in Competent Group					
Totals	12	26	2	1	30	36
Competents:						
On20	2	3	0	0	3	6
On21	0	1	0	0	5	7
On27	4	4	0	0	5	7
On29	9	20	1	1	19	19
On201	4	22	0	0	4	6
Om28	4	8	0	0	21	13
Om203	5	9	0	0	4	6
Om33	1	10	1	1	13	10
Om34	9	10	1	1	13	10
Totals	38	87	3	3	87	84

Task Reference Averages

Task #	1	2	3	4	5	6
Incompetents:	2.40	5.20	.40	.20	3.33	4.00
Competents:	4.22	9.66	.33	.33	9.66	9.33
Differences:	1.82	4.46	-.07	.13	6.33	5.33

Table 8

Statistical Results of Table 7 by Task Reference

Task #1:	$\bar{X}i$ = 2.400000	SDi = 3.286336
	$\bar{X}c$ = 4.222223	SDc = 3.153482
	T = 1.021442	P = .3271967
Task #2:	$\bar{X}i$ = 5.200000	SDi = 4.438468
	$\bar{X}c$ = 9.666667	SDc = 7.193748
	T = 1.249629	P = .2352587
Task #3	$\bar{X}i$ = .400000	SDi = .547723
	$\bar{X}c$ = .333333	SDc = .500000
	T = .231455	P = .8208611
Task #4	$\bar{X}i$ = .200000	SDi = .447214
	$\bar{X}c$ = .333333	SDc = .500000
	T = .4948717	P = .6296271
Task #5	$\bar{X}i$ = 6.000000	SDi = 2.915476
	$\bar{X}c$ = 9.666667	SDc = 6.982120
	T = 1.105914	P = .2904425
Task #6	$\bar{X}i$ = 7.200000	SDi = 3.633180
	$\bar{X}c$ = 9.333333	SDc = 4.358899
	T = .9258201	P = .3727843

Table 9

Class Performance Results of Participants

Class Designator:	1106	1107
Incompetents:		
On11	N	NT
	N	
Om12	N	NT
Om17	P	B-
Om18	P	NT
Om102	P	NT
Om33	P	B-
Om34	P	C+
Competents:		
On20	P	A
On21	P	B+
On27	P	B-
On29	P	NT
On201	P	B+
Om28	P	NT
Om203	P	NT

Key: P = Pass
N = No Pass
NT = Course Not Taken
All Letter grades represent usual A/F grading

* Updated through Winter Quarter 1984.
University of Minnesota, Duluth