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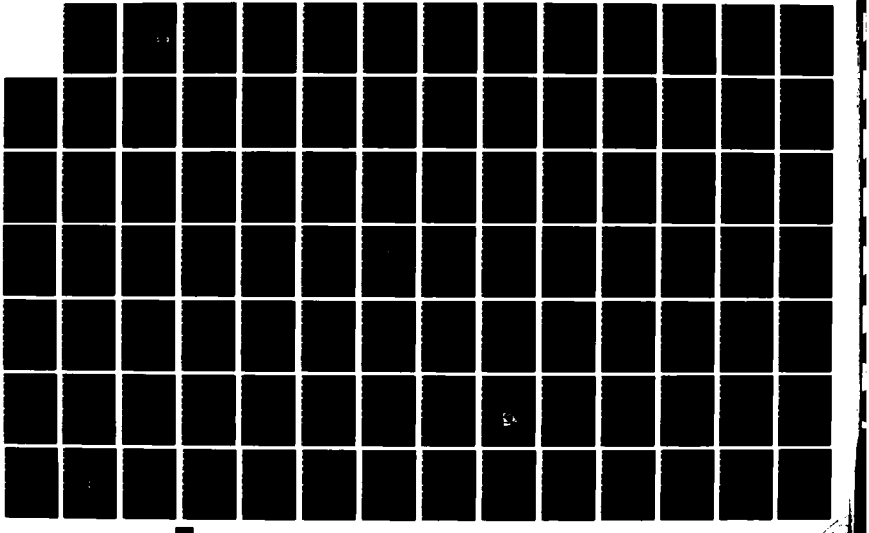

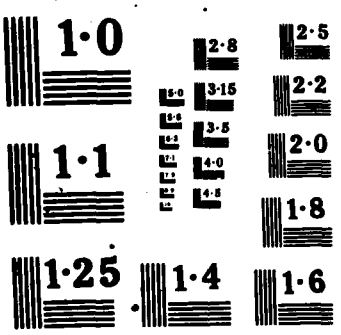

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Increasing Productivity through Social Structure: Final Project Report

Bibb Latane

February 15, 1985

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Abstract

During the contract period, a major research program aimed at discovering the factors affecting the phenomenon called social loafing was completed. Social loafing is the tendency for participants who share responsibility for carrying out a task to exert less effort than when they alone are responsible for carrying out the same task. It has obvious and important implications for motivation, learning and training, memory, information processing, decision making, and productivity--all phenomena of interest to complex, modern organizations.

The contract has helped support conferences and convention presentations and journal articles and chapters. Journal citations, textbook and other coverage indicate that the impact of the P.I.'s research in the field has been significant.

Not the least of the accomplishments supported by ONR has been the development of an on-going data collection facility which promises to be a major resource for scientists doing research on individuals working in groups and/or groups themselves.

~~The final phase of~~ The research reported on here was conducted in the context of this custom-designed, computer-based, telecommunicating on-going work organization of 96 military-age part-time employees (in other words, 18-22 year-olds were hired to work several hours a week for a year in front of computer terminals, communicating with each other and with their supervisors only by machine). Pretesting had shown this setting to be well suited for answering questions about social loafing as well as questions about the effect of mediating human interaction through a computer. ~~The ONR contract supported the development of this complicated but efficient data collection system and its use in~~ The collection of data ~~from a sample of 96 participants~~ during the 1983-84 academic year.

When participants share responsibility for carrying out a task, they exert less effort than when they alone are responsible for carrying out the same task. This phenomenon, termed social loafing, has obvious implications for any organization in which there is a concern for enhancing group productivity.

Since 1980, ONR has supported my research on social loafing. The first two years of that research were conducted at the Ohio State University and culminated in the publication and presentation of a number of articles and papers. Recognition for the progress made during those years came in the form of the Socio-Psychological Prize awarded by the American Association for the Advancement of Science and by the fact that this research has stimulated a large body of work by other investigators and is now cited prominently in most new textbooks.

The third year of research was facilitated by my move to the University of North Carolina at Chapel Hill, where I became Director of the Institute for Research in Social Science. The Institute's substantial resources for research, along with ONR support, allowed the development of a computerized data collection facility, called CAPS (for Computer Administered Panel Study) and its testing on a panel of ninety-six research respondents who completed twenty weekly sessions. This facility allowed the collection of a massive amount of data, much more than could be collected with similar resources by conventional means. The test results show that it is possible to collect data of very high quality (as is typical of computer-collected data) with remarkably low attrition rates (only seven respondents had to be replaced during the twenty-week study period.) Accompanying this report are four technical papers which outline the findings of the CAPS research effort.

Locus for the Research

Several attributes made the Institute for Research in Social Science particularly well suited for maximizing the potential scientific merits of the ONR research just completed. First, the Institute is open for supervised operation 95 hours per week (daily, from 8 am to 11 pm except Saturday night and Sunday morning). Since the presence of an experimenter is not required, participants were able to schedule their weekly appointments at their own convenience and still be assured that trained Institute staff would be on hand if problems should develop. This maximized the benefit derived from the costly equipment required for the project. Second, the Institute's Data Library provides an excellent resource for the archiving and dissemination of the project data to researchers both within and outside of the University, ensuring easy access for secondary analysis and further maximizing the benefit derived from the resources originally devoted to the project. The development of a computerized archiving and retrieval system, now underway, will make possible the sharing of data with researchers all across the

country, including other ONR contractors. Finally, the Institute's ability to bring to bear the expertise of a number of relevant disciplines substantially enriched the research environment.

The Research Facility

Respondents. The CAPS facility combined existing Institute resources with those of the ONR project. A panel of ninety-six research participants was recruited to complete twenty, weekly, sixty- to ninety-minute computer-mediated sessions at which they received instructions and performed tasks or answered questions on a terminal interfaced with the project's Eclipse minicomputer.

All CAPS respondents were assigned to one of thirty-six ongoing work groups and communicated regularly with the other members of these groups through informal teleconferences during each weekly session. This feature allowed us to look at how characteristics of work groups themselves, such as sex composition and cohesion, affect productivity. The longitudinal design permitted us to examine these effects under very realistic circumstances, since the same dynamics which produce such effects in natural groups as they interact over time can be expected to have been at work in our experimental setting. Thus the design allowed the assessment of productivity within groups developmentally (i.e., looking at the standing group over time) and comparatively (i.e., comparing the performance of standing and temporary groups).

Executive System and Supporting Programs. While the longitudinal nature of the design, the number of group characteristics manipulated and the variety of tasks employed to measure productivity offered unique research opportunities, they also posed significant scheduling and administration problems. Therefore, an automated system which assigned participants to research tasks, ran and monitored tasks, organized data files for analysis and provided a simple electronic mail system for experimenter-participant and participant-participant communication was developed to support this research effort. This experimental executive system performed the following operations:

1. When a respondent began a weekly CAPS session, the executive system first checked for and, if necessary, delivered any messages from the experimenters. Messages could be either general, intended for all participants, or specific and intended only for a single respondent. Participants were always told the current amount of "salary" earned to date.

2. After delivering messages the system checked the respondent's task list to see which tasks he/she had completed and selected the next task scheduled for that person.

3. Prior to administering each task, the system also determined the experimental condition assigned to the individual and presented the appropriate task-program module.

4. After an individual completed certain task modules, the system offered him/her the option of continuing to another task or ending the session. However, if the respondent had almost exhausted the time allotted for the session (usually 60 minutes), the option to continue was not offered.

5. At the end of each CAPS session the system administered a standard, session assessment questionnaire and offered the option to send messages to the experimenters. It also credited the respondent with completing the week's tasks and added an appropriate amount of money to his/her "salary" account.

Some improvements were made to the CAPS executive system during the first year of data collection and, while additional revisions were made before data collection resumed in the fall of 1984, the system performed very well in its first year of operation. For the most part, CAPS respondents came and went from their scheduled sessions without contact with the project staff. While staff members were available at all times in case respondents encountered any problems, such problems rarely occured. The existence of this well designed executive system allowed for the smooth operation of the research program with a larger number of respondents and a smaller number of staff than would otherwise have been possible. We feel that improvements based on what was learned during the 1983-84 testing, have resulted in an even better system for the 1984-85 operation and will contribute greatly to the efficiency and productivity of our research program.

An additional support program for the construction of questionnaire modules without source code programming was also developed. The program is used for the construction of questionnaires that include branching and answer-validity checking and allowed the preparation of these relatively simple units by lower level staff, freeing the project's two full-time programmers for the development of more complex units requiring sophisticated systems analysis and programming. In the 1983-84 program of research, more than thirty questionnaire modules were developed and administered using this program.

Staff. The full-time CAPS project staff in 1983-84 consisted of the project manager, Dr. Beverly Wiggins, who, under my direction, supervised the preparation of experimental units and handled the administrative aspects of the project; two experienced and highly qualified programmer analysts, David Smith and Phillip Boles, who developed the executive system, questionnaire program and the experimental modules; and one research analyst, Claudia Egelhoff, who handled data management tasks once the data were collected. A number of other Institute staff members contributed their expertise to the research effort on a part-time basis. Dr. John Barefoot worked closely with me on the research designs for a number of the social loafing units and has collaborated with me on the writing of the four technical reports referred to later in this document. Dr. Martin Dillon,

IRSS Research Associate, and Diana McDuffy, Director of the Institute's Data Library, have been working to develop automated archiving and retrieval systems for the massive amount of data collected by the CAPS project to ensure that it is made available to researchers for secondary analysis. This relatively small research staff has been able to collect in a nine month period, an estimated 100 million bytes of machine readable information about the ninety-six CAPS participants. Despite the tremendous quantity of information collected, the data are remarkably clean and complete. (We collected some information from the respondents in both paper-and-pencil and computerized form in order to test our belief that the computer-mediated data collection, when properly managed, produces data of better quality and more efficiently than do traditional data collection techniques.)

Equipment. The experimental executive system was designed, coded and tested on a Data General Eclipse S/140 minicomputer which was used during 1983-84 as the "production" machine. Although it operated very reliably and shows great promise for other research areas amenable to computer mediated experiments and questionnaires, the complexity of the system and the number of participants taxed the capacity of this lower level machine, which proved to be the "weak link" in the operation of the research program during 1983-84. Response time was frequently very slow and interfered with participant access to tasks and development of experimental task programs. In addition, the amount of data collected often exceeded the capacity of the disk drive (25 megabytes), necessitating frequent tape dumps and causing database administration problems.

The Department of Defense has recently funded our proposal for purchasing a Data General Eclipse MV/4000 and a large capacity disk drive. The increased computer capability which this software-compatible upgrade will afford will solve both the response time and disk capacity problems experienced with our current, smaller machine. Because of the compatibility of operating systems and programming languages, conversion problems should be minimal. The new configuration of equipment will provide a logical and cost effective upgrade in computing power that will allow the system developed thus far to be used to its fullest potential.

Methodology

The methodology used during the 1983-84 operation is detailed in the series of quarterly reports which are included as Appendix A.

Progress to Date: Research Findings

My original proposal to ONR was stimulated by the finding that when individuals think their own contribution to a group product cannot be measured, their output tends to slacken. This phenomenon, called social loafing, is problematic for social organizations, including schools, industry, government agencies,

and the armed forces, which must deal with many individuals and which often depend upon the products or performance of groups, such as divisions, sections, units, squadrons, teams, etc., rather than those of individuals. In the first two years of the ONR grant, my associates and I have investigated a number of determinants of group productivity, including identifiability, comparability, perceived motivational level of others in the group, strength of the authority giving instructions, amount of effort required by the task, task involvement, and task structure (individual, conjunctive, disjunctive, additive). Appendix B summarizes the results of these studies.

Encouraged by our preliminary findings, we developed the CAPS data collection system, which opens up research possibilities going far beyond those afforded by standard methodologies. Within this new research environment, we have been able to examine the effects of experience, both with one's tasks and one's partners, thus more closely modeling the ways in which groups work in organizational life. We also have been able to collect a large amount of demographic and personality data on participants, so that we can look at whether background or personality factors are correlated with individual differences in social loafing.

The results of the experiments conducted during the 1983-84 testing of the CAPS system are detailed in a series of four technical reports:

The CAPS Methodology report summarizes important findings regarding the research facility and methodology itself. In addition to providing an overview of the facility, the report compares CAPS data to other samples and reports the results of comparisons on the CAPS sample itself between computer administered and paper and pencil tests. Problems and potential benefits of this unique data collection facility are also discussed.

A second technical report covers a series of studies which address decisionmaking and informal communication in computer-mediated communication. In this report, the impact of computer-mediated communication on group processes is assessed. Respondents, who were part of ongoing, three-person work groups took part in two decisionmaking studies, half under an identified and half under an anonymous condition. The effect of these conditions on productivity (measured by time on task, amount of information generated, and quality of information generated) and on accuracy of decision (compared with expert ratings) was examined. Measures of actual and perceived influence were also obtained. The data indicate that effective group communication can take place in the computer-mediated environment and that anonymity had little effect on either performance quality or patterns of influence, perhaps due to the relative weakness of the identified condition in this research setting.

The data on informal interactions provide evidence for the

feasibility of informal interaction and substantial communication of socio-emotional content via computer networks. The data suggest that the computer may not be as poor a medium for this sort of interaction as once supposed.

The third report covers a series of seven social loafing experiments carried out in the context of the CAPS project. These seven experiments consisted of sixteen separate units administered to the CAPS respondents (fourteen via the computer terminals and two replications of off-computer tasks).

Two of the most significant findings borne out in those experiments are that social loafing does occur on cognitively effortful as well as physically effortful tasks and that social loafing occurs in standing as well as ad hoc groups. These findings underscore the relevance of the loafing phenomenon for modern organizations. Additional findings suggest that task characteristics and other manipulable factors, such as incentive structures, can have important effects on loafing as well. However, the nature of these effects is not yet clear.

An important by-product of the computer mediated collection of data is that we can examine the effects of electronic mediation of interpersonal communication in task groups on productivity. Electronic mediation, which is becoming more and more common in such high-technology organizations as the armed forces, may make individuals feel more anonymous, even when working alone, or, may make them feel more identifiable, even when working in groups. Either condition would be predicted, based on previous findings, to reduce the difference between performance in alone and group conditions, minimizing the loafing effect. Yet, our results show significant loafing despite the electronic mediation of communication, demonstrating that, whatever its precise effects, electronic mediation does not overcome the social dynamics which produce social loafing.

Of course, the results described in the above report represent only some of the possible interesting and useful analyses of the data collected by CAPS. All of the data have been archived in the IRSS Data Library and are available to researchers from across the country for secondary analysis. Appendix C lists the datasets available from the 1983-85 data collection years.

A fourth and perhaps most important report will appear as a chapter in Goodman, P., (ed.), Groups in Organizations. This report shows how diffusion of responsibility can be understood within the larger context of the author's theory of social impact, which deals with how an individual's physiological states, subjective feelings, motives, emotions, cognitions, beliefs, values, and behavior are affected by the presence or actions of other people in his or her environment.

Conservation of the Research Facility

Perhaps the proudest accomplishment of the research program facilitated by ONR support has been the establishment of the CAPS data collection facility itself. In its first two years of operation, 31 faculty members and 11 graduate students, representing 16 different departments on the UNC campus have utilized the facility. During the two years, almost 400 research units were administered to the CAPS respondents.

Each year, 20 to 30 hours of data collection time per respondent has resulted in a highly valuable and unusual data resource. The immense amount of data available on each respondent allows the exploration of research questions not possible with other, more traditional, data-gathering facilities. The value of these data is increased even further by their availability to other researchers for secondary analysis through the Institute's Data Library.

At this time, CAPS is about to begin its third year of data collection. During the first few months of year three, conversion to the new MV/4000 and development of a new executive system will be achieved, increasing the capacity and efficiency of the operation. Other software improvements have already been implemented. Consideration is being given to expansion, perhaps doubling, of the number of respondents in future years. In short, the establishment of CAPS as a long-term data resource for the social science community is a major accomplishment of the research supported by ONR. Evidence of the importance of the CAPS facility is its coverage in a Science article on computer based developments in the social sciences (Heise and Simmons, 1985).

Impact on the Field

Included in this report is a list of the many papers and publications which have been supported by this ONR grant. More important than the actual number of publications, however, is their impact on the field--the extent to which they have influenced others. Although this is difficult to measure and to disentangle from the PI's previous work, three lines of evidence suggest that the impact of these studies has been great:

1. Journal citations. An examination of the Social Science Citation Index for 1980-85 reveals that the research of the Principal Investigator has been cited in more than 500 scientific publications, an average of about 120 citations per year

2. Textbook coverage. Perlman (1975, 1984) in analysing social psychology textbooks published in the early 1970's and 80's, reports that the Principal Investigator was the sixth more frequently cited person in the latter period, up from sixteenth in the earlier.

3. Other coverage. Science writer Morton Hunt, sponsored by a grant from the Russell Sage Foundation, has recently completed a book on research approaches and strategies in social science. Each chapter covers a different research approach, such

as survey research, demographic analysis, etc. by taking an exemplary program of research in each tradition and describing it in detail. For his chapter on experimental methods in social psychology, Hunt chose to cover the program of research on social loafing supported by the present grant:

Papers Presented

Latanè, Bibb The Mathematics of Responsibility, William & Mary, Williamsburg, 1985.

Latanè, Bibb Social Loafing and Social Motivation, Virginia Polytechnic Institute, Blacksburg, 1984.

Barefoot, John, and Latanè, Bibb, "Social Loafing: Research Using the CAPS Panel," IRSS Colloquium, 1984.

Barefoot, John, Latane', Bibb and Wiggins, Beverly "Social Loafing: Past and Present Research," Organizational Research Group, Department of Psychology, January 23, 1984.

Latanè, Bibb, The multiplication and division of responsibility, University of Illinois, Champaign, 1984.

Latanè, Bibb, Social loafing in a computer-mediated organization. ONR Conference on Organizational Effectiveness, Washington, 1984.

Latanè, Bibb, Individual effort in organizations, Carnegie-Mellon Conference on Groups in Organizations, Pittsburgh, 1984.

Latanè, Bibb, Diffusion of Responsibility: From the Unresponsive Bystander to the Social Loafer, Invited Address, West Virginia Psychological Association, Pipestem, 1984.

Williams, K., Williams, K., Kawana, Y. & Latanè, B. Social loafing in Japan: A developmental cross-cultural study. Midwestern Psychological Association, Chicago, 1984.

Kawana, Y. & Latanè, B. National stereotypes of Americans and Japanese. Japanese Psychological Association, Osaka, 1984.

Latanè, B. Social loafing. Presidential Address, Midwestern Psychological Association, Chicago, 1983.

Latanè, B. Fifteen years of responsibility diffusion. Invited Address, Southeastern Psychological Association, Atlanta, 1983.

Latanè, B. Social loafing in Japan. Midwest Academy of Management, Columbus, 1982.

Scarlet, S., Lynn, M. & Latanè, B. Social impact theory: Turning the tables on tipping. Eastern Psychological Association, Baltimore, 1982.

Lynn, M. & Latanè, B. The social psychology of tipping. Eastern Psychological Association, Baltimore, 1982.

Jackson, J. M., Harkins, S. G. & Latanè B. The role of within and across group comparability in eliminating social loafing. Midwestern Psychological Association, Minneapolis, 1982.

Jackson, J. M. & Latanè, B. Experimenter immediacy and social loafing. Midwestern Psychological Association, Minneapolis, 1982.

Kawana, Y. & Latanè, B. Social loafing in Japan. Japanese Psychological Association, Kyoto, 1982.

Gabrenya, W. K., Latanè, B. & Wang, Y. E. Social loafing in the United States and China. American Psychological Association, Washington, 1982.

Gabrenya, W.K, Latanè, B. and Wang, Y.E. Social Loafing among Chinese Overseas and US Students. Second Asian Conference of International Association for Cross-Cultural Psychology, Taipei, August, 1981.

Weiner, N., Pandey, J. & Latanè, B. Individual and group productivity in the United States and India. American Psychological Association, Los Angeles, 1981.

Gabrenya, W. K., Jr., Latanè, B. & Wang, Y. E. Social loafing among Chinese overseas and U.S. students. Joint IACCP-ICP Asian Meetings, Taipei, 1981.

Weiner, N., Latanè, B. & Pandey, J. Social loafing in the United states and India. Joint IACCP-ICP Asian Meetings, Taipei, 1981.

Latanè, B. Social loafing in cross-cultural perspective. Joint IACCP-ICP Asian Meetings, Taipei, 1981.

Latanè, B. Individual productivity alone and in groups: A proposal for cross-national research. XVIII Interamerican Congress of Psychology, Santo Domingo, 1981.

Wolf, S. & Latanè B. The social impact of majorities and minorities. Midwestern Psychological Association, Detroit, 1981.

Pusateri, T. & Latanè, B. Number of sources, number of messages, message presentation, and persuasion. Midwestern Psychological Association, Detroit, 1981.

Gabrenya, W. K. & Latanè, B. Social loafing in cross-cultural

perspectives: Chinese and Americans. Midwestern Psychological Association, Detroit, 1981.

Wolf, S. & Latanè, B. Majority and minority influence on restaurant preferences. Eastern Psychological Association, New York, 1981.

Latanè, B. Work group structure. Organizational Effectiveness Research Progress Review, Orlando, 1981.

Weiner, N. & Latanè, B. Social loafing and group productivity. International Seminar on Understanding Organizational Reality, Calcutta, 1981.

Latanè, B. Social impact in organizations. International Seminar on Understanding Organizational Reality, Calcutta, 1981.

Weiner, N. & Latanè, B. Cultural factors influencing productivity. Fifth International Conference on Cross-Cultural Psychology, Bhubaneswar, 1980.

Latanè, B. & Weiner, N. Social factors affecting individual and group productivity: Cross-cultural perspectives. Fifth International Conference on Cross-Cultural Psychology, Bhubaneswar, 1980.

Wolf, S. & Latanè, B. Minority vs. majority influence in the choice of a restaurant. International Symposium on Social Influence Processes. Laboratoire Europèen de Psychologie, Barcelona, 1980.

Latanè, B. & Wolf, S. Social influence of minorities and majorities. International Symposium on Social Influence Processes, Laboratoire Europèen de Psychologie Sociale, Barcelona, 1980.

Harkins, S. & Latanè, B. Population and political participation. American Psychological Association, Montreal, 1980.

Jackson, J. & Latanè, B. Status and number of solicitors and the urge toward altruism. American Psychological Association, Montreal, 1980.

Latanè, B. Social factors affecting group productivity. International Conference on the Development and Maintenance of Prosocial Behavior, Polish Academy of Sciences, Warsaw, 1980.

Wolf, S. & Latanè, B. Interactive television and social influence. Midwestern Psychological Assocaition, St. Louis, 1980.

Schwieger, P., Turpin, B. & Latanè, B. Effects of hypertensivity on the gregariousness of rats. Midwestern Psychological Association, St. Louis, 1980.

Nida, S., Jackson, J. & Latanè, B. Tipping in taxicabs. Midwestern

Psychological Association, St. Louis, 1980.

Jackson, J. & Latanè, B. Stage fright as a function of number of co-performers: A field study. Midwestern Psychological Association, St. Louis, 1980.

Harkins, S. & Latanè, B. Social loafing in the New England town meeting. Midwestern Psychological Association, St. Louis, 1980.

Thompson, J., Jackson, J., Williams, K. & Latanè, B. The effects of coactor ability on social loafing. Graduate Student Conference in Personality and Social Psychology, Columbus, 1980.

Pusateri, T. & Latanè, B. Source evaluations as a function of achieved and ascribed variables. Graduate Student Conference in Personality and Social Psychology, Columbus, 1980.

Publication Activities

Gabrenya, W.K., Wang, Y.-E., & Latanè, B. Social loafing on an optimizing task: Cross-cultural differences among Chinese and Americans. Journal of Cross-Cultural Psychology, 1985, 16, 223-242.

Latanè, B., Theory of social impact. In Marin, G. & Padilla, A.M. (Eds.) Community psychology in Latin America. Mexico City, Editorial Trillas, in press.

Lynn, M. and Latanè, B. The psychology of restaurant tipping. Journal of Applied Social Psychology 1984, 14, 551-563.

Gabrenya, W.K., Latanè, B, and Wang, Y.E. Social loafing in cross cultural perspective: Chinese on Taiwan. Journal of Cross-Cultural Psychology, 1983, 14, 368-384.

Latanè, B. & Wolf, S. Majority and minority influence on restaurant preferences. Journal of Personality and Social Psychology, 1983, 45, 282-292.

Gabrenya, W. K., Latanè, B. & Wang, Y. Social loafing in cross-cultural perspective: Chinese on Taiwan. Journal of Cross-cultural Psychology, 1983, 14, 368-384.

Beza, A. & Latanè, B. Multipurpose data collection facility at the Institute for Research in Social Science. Social Science News Letter, 1983, 68, 27-31.

Pusateri, T. P. & Latanè, B. Respect and admiration as a function of achieved and ascribed characteristics: Evidence for configural information integration. Personality and Social Psychology Bulletin, 1982, 8, 87-93.

Latanè, B. The psychology of social impact. American Psychologist, 1981, 36, 343-365.

Latanè, B. & Wolf, S. The social impact of majorities and minorities. Psychological Review, 1981, 88, 438-453.

Latanè, B. & Nida, S. Ten years of research on group size and helping. Psychological Bulletin, 1981, 89, 308-324.

Latanè, B., Nida, S., & Wilson, D. The effects of group size on helping behavior. In Rushton, J.P. & Sorrentino, R.M. (Eds.) Altruism and helping behaviour. Hillsdale, NJ, Lawrence Erlbaum Associates, 1981.

Williams, K., Harkins, S. & Latanè, B. Identifiability and social loafing: Two cheering experiments. Journal of Personality and Social Psychology, 1981, 40, 303-311.

Jackson, J. M. & Latanè, B. All alone in front of all those people: Stage fright as a function of number and type of co-performers and audience. Journal of Personality and Social Psychology, 1981, 40, 73-85.

Jackson, J. M. & Latanè, B. Strength and number of solicitors and the urge toward altruism. Personality and Social Psychology Bulletin, 1981, 7, 415-422

Wolf, S. & Latanè, B. If laboratory research doesn't square with you, then QUBE it. Personality and Social Psychology Bulletin, 1981, 7, 344-352.

Latanè, B., & Nida S. Social impact theory and group influence: A social engineering perspective. In Paulus, P.B. (Ed.) Psychology of group influence. Hillsdale, NJ, Lawrence Erlbaum Associates, 1980.

Harkins, S., Latanè, B. & Williams, K. Social loafing: Allocating effort or taking it easy? Journal of Experimental Social Psychology, 1980, 16, 457-465.

Personnel

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APPENDIX A

Quarterly Status Report to the Office of Naval Research
March 25 - June 25, 1983

Title: Increasing Productivity through Social Structure

Contract Identification: N00014-83-K-0279

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Research Activities

In academic year 1983-84, IRSS will undertake a series of studies in which 96 undergraduate respondents complete weekly computer-mediated data-inputting sessions. At these sessions, the respondents will supply background and attitudinal information, and take part in both individual and group experimental tasks. Particular attention is being given in the studies to the determinants of productivity in organizations and to the effects and effectiveness of mediating organizational communication by computer.

The IRSS Computer-Assisted Panel Survey (CAPS) has been designed to investigate the factors which affect productivity in ongoing organizations. Of particular interest are such factors as whether the task is defined as a group or individual endeavor, the degree to which the performance of the individual is identifiable, the nature of the group performing the task (ad hoc vs. standing), and the background characteristics of the individuals which might interact with these variables.

Participants in the study will be administered a number of tasks designed to measure motivation and performance. These include cognitive production tasks (e.g., brainstorming), decision tasks in which both strategy and performance quality can be measured, and learning tasks. Versions of these tasks will be administered repeatedly to participants throughout the course of the study, with the task definition (group vs. individual, anonymous vs. identifiable) being varied.

One of the major advantages of this data collection system is the opportunity it provides to study productivity over time in an ongoing organization. Special effort has been made to take advantage of the longitudinal nature of the study design. Measures of motivation and productivity will be replicated throughout the course of the study. This will allow us to

monitor the magnitude of social loafing over time and relate it to background characteristics and work history of the worker. In addition, each participant will be a member of an ongoing work group. They will frequently work on tasks with the people in the group and regularly communicate with them through an informal teleconference. This will allow us to examine social loafing in groups, both developmentally (looking at performance of the standing group over time) and comparatively (comparing the performance of standing and temporary groups).

During the reporting period March 24-June 24, 1983, a number of research units were designed or adapted for use on the Insitute's Data General Eclipse minicomputer. Major project activities undertaken this period included research design, programming, and preliminary pretesting of the research units. Programming for some six units has been completed and modifications based on pretest results are being made. A preliminary schedule of experiments for the fall semester which includes these units has been developed.

A program to administer group decision tasks was chosen for initial development and pretesting because it was the most difficult and time-consuming program planned for the first year of the study. Two versions have been written and successfully pretested on a sample of undergraduates recruited from psychology courses. One of these versions allows the group to discuss and arrive at a decision to a complex strategy problem while all group members are simultaneously working at different nodes of the system. The other version is designed to allow messages to be sent to other group members who are participating at different hours. These two programs give us the capability to study the impact of sequential vs simultaneous interaction on group decision-making.

A second of the programs designed during this period is expected to prove especially useful as we undertake the ONR project. Using the program, questionnaires can be readied for computer administration much more quickly and easily than by using standard computer languages such as BASIC or FORTRAN. The documentation allows even persons without knowledge of programming to construct questionnaires which include simple branches. Data analysis is facilitated by the inclusion in the program of a feature which converts the data to a SAS file.

Finally, an executive program has been written and installed on the Eclipse which monitors the progress of the respondents, administers the appropriate tasks to them, and organizes the data files created in the study. When the respondent begins a session, this system checks to see which tasks the subject has previously completed and administers the appropriate problem. It also checks the condition assignment of the respondent and administers the appropriate manipulation. After each task, the subject is given the option of continuing or ending the session. If the respondent chooses to quit, the system administers a standard post-session questionnaire and gives the participant the

opportunity to send free-text messages to the experimenter. The executive system organizes the data files created for each subject in a way which facilitates their later transfer to analysis files. In addition, the executive system performs the accounting function of keeping track of the amount of money accrued by each participant and automatically adds the appropriate amount of money each time the respondent completes the tasks assigned for the week.

Publication Activities

Latane', B. & Wolf, Majority and Minority Influence on Resraurant Preferences, Journal of Personality and Social Psychology, 1983, vol. 45, no. 2, 282-292.

Beza, A. & Latane', B. Multipurpose Data Collection Facility at the Institute for Research in Social Science, Social Science News Letter, Jan./April 1983, vol. LXVIII, no. 1-2, 27-31.

Personnel

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Research Associates:	John Barefoot Ellen Vasu
Graduate Research Associates:	Yoshihiro Kawana
Affiliated Personnel:	Phillip Boles, computer programmer Bonita Samuels, typist David Smith, computer programmer Ken Hardy, director of stat lab

Quarterly Status Report to the Office of Naval Research
June 25 - September 25, 1983

Title: Increasing Productivity through Social Structure

Contract Identification: N00014-83-K-0279

Principal Investigator: Bibb Latane'
Institute for Research in Social Science
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Research Activities

During this reporting period, design, programming and pretesting of research units for the ONR project was continued. Based on pretest results, major refinements in several of the units were made to improve the clarity of instructions and elegance of presentation. Some of these units have been scheduled for administration during an eight week series of sessions to be carried out over the fall semester.

A random sample of 1000 UNC undergraduates was drawn from those students registered for the fall semester. (Students with birth years other than 1961-65 and those who had withdrawn from school since registering were eliminated from the sample frame.) A systematic sample of 300 was drawn from the sample of 1000. Those 300 students received, from the director of the Institute and project principal investigator, a letter inviting them to apply for one of 96 positions as respondents in a panel study involving computer interaction. The mailing to these students included a stamped postcard with which to indicate their interest in learning more about the project and to sign up for an orientation session. Because fewer cards were received from males on the first few days following the mailing, a follow-up mailing to those males who had not returned their cards was done three days following the original mailing. The follow-up letter simply reminded students to return their cards and gave them a telephone number to call if they had questions they wanted to ask prior to an orientation session. Within seven days of the original mailing, fifty-five percent of the cards were returned indicating an interest in the study and signing up for one of twenty orientation sessions scheduled during the next week.

During the week of September 21, four orientation sessions were held per weekday to give interested students more information about the project, to answer their questions, and to

obtain background and scheduling information from those who wanted to apply for positions as respondents. This large number of sessions was scheduled to allow a demonstration for the small number of students at each session of how their weekly research sessions would work. The students were shown where they would be working, how they would log on to the computer system, how to enter responses, how to make corrections, and how to make sure that they were logged off correctly. Before leaving the session, students interested in respondent positions also completed an agreement form which detailed requirements for attendance and performance, gave information on how and when payments would be made to respondents, and obtained their consent regarding access to existing records and potential future use of the project data. One-hundred and twenty-nine students attended the orientation sessions and all of these students signed the agreement form and completed the scheduling form to apply for positions as study respondents.

The students' schedule information (which indicated when they could not or did not desire to be scheduled for a weekly research session) was entered into the computer and a program designed specifically for this project was used to maximize the number of students assigned 90 minute research sessions on one of three video-display terminals reserved for study respondents. The program scheduled 118 of the 129 applicants based on the match between terminal availability and the students' preferences. Twenty-two extra students were eliminated through random selection so that 48 male and 48 female respondents were retained. Four additional students were chosen randomly to serve as pretest respondents. All respondents were notified of their weekly appointment time and those students not selected to participate received letters thanking them for their interest and letting them know that they might be contacted in the future if replacement respondents were needed.

The administration of the first research session is scheduled to begin on October 5, 1983.

Papers Presented

Barefoot, J. and Hardy, K. "New Computer-Assisted Data Collection Facility at IRSS," IRSS Coloquium Series, Summer, 1983.

Personnel

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Quarterly Status Report to the Office of Naval Research
September 25 - December 25, 1983

Title: Increasing Productivity through Social Structure

Contract Identification: N00014-83-K-0279

Principal Investigator: Bibb Latane'
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Research Activities

During this reporting period, the administration of research units to respondents was begun. Respondents completed eight weekly sessions which included nine units designed specifically to test the social loafing effect in the context of decisionmaking, cognitive, and learning tasks. Twelve units designed to assess the respondents' demographic and social-psychological characteristics were also administered. Teleconference and wrap-up units were administered at each of the eight weekly sessions.

The ninety-six respondents were assigned membership in both a standing group and an anonymous group. Each group consisted of three respondents who were not assigned the same appointment time. All groups were of mixed-sex composition, with an equal number of MMF and FFM groups. Respondents knew the identities of the persons in their standing groups and were given the opportunity at each weekly session to send messages to and receive messages from those persons. The existance of these groups allows us to look at social loafing over time, as the group members become better acquainted with each other, and to compare performance under several conditions-- individual versus group responsibility for performance, and within the group responsibility condition, individual identity versus anonymity. Condition assignments for many of the research units were based on group membership. In all cases, at least one MMF and one FFM group was assigned to each experimental condition.

The smooth operation of the system during this development phase can itself be considered a major accomplishment. Attrition rates have been surprisingly low...with only two of the ninety-six respondents being replaced. Respondents have reported to their sessions very reliably, ensuring timely completion of the research units. Pretesting has minimized problems with the units themselves. In fact, the major limiting factor in the project

has proven to be the Data General Eclipse S/140 minicomputer which is now used as the production machine. Although it has operated very reliably and shows great promise for other research areas amenable to computer-mediated experiments and questionnaires, the complexity of the executive system and the volume of subject sessions has taxed the capacity of this lower level machine. Frequently, as many as four respondents and four programmers must all use the system at the same time.... the respondents to complete weekly sessions and the programmers to do programming for research units and system maintenance. In such cases, response time is very slow and interferes with the timely completion of data collection and development of experimental task programs. In addition, the amount of data collected often exceeds the capacity of the 20 megabyte disk drive, necessitating frequent tape dumps and causing database administration problems. These problems could be easily solved with a more powerful, software-compatible minicomputer.

Description of Social Loafing Units

Wordgames. (Two units.) This anagrams task instructed respondents to make words of four or more letters from four stimulus words (two per unit). In each unit, respondents worked under two of three instruction conditions-- individual, anonymous group, and standing group. The order of the instruction conditions and words as well as the difficulty of words were varied. The primary hypotheses concern the effects of instruction condition on productivity for a task involving cognitive effort... specifically, do respondents work harder when told that their productivity on such a task will be measured by their individual score than they do when told that their score will contribute to a group score which will be recorded? Do persons work harder to produce a high score for an identified group whose members they interact with regularly than for one whose members are anonymous (and to whom they are anonymous)? Do these effects vary depending on the difficulty of the task? Preliminary analyses of these data do indicate a social loafing effect.

Brainstorm. (Two units.) In each unit of this task, an extension of Harkins, W. and Petty, R., "Effects of Task Difficulty and Task Uniqueness on Social Loafing." JPSP, 1982, respondents were asked to generate uses for two `easy' objects (a small kitchen knife and a shoebox) or for two `difficult' objects (a detached doorknob and a burned-out lightbulb). In each unit, half of the respondents worked on one item under the individual condition (told that their individual score would be recorded) and one item under the standing group condition (told their score would be averaged with the scores of their regular group members and the group score recorded). The other half of the respondents worked on one item under the individual condition and the other under the anonymous group condition (told that their score would be averaged with the scores of two other unidentified respondents

and the group score recorded). The order of presentation of condition assignments and stimulus objects was varied. The primary questions of interest here concern the effects of task difficulty on social loafing and comparison of loafing in the two group conditions. Because this task involves more creativity than did the wordgames task, it will be possible to assess the effect of task type on social loafing.

Lunar Survival. (Two units.) Respondents were presented with a lunar crash scenario and asked to rate the importance of fifteen items for survival in the lunar environment. They were also given the opportunity to write up to two lines of comments per item explaining their reasoning which would be shared, along with their ratings, with two other respondents. They were told that the task would be repeated after all respondents had been given the chance to review the ratings and comments of two others. Half of the respondents were told that the two others whose work they would see and who would see their work would be the members of their regular standing groups. The remaining respondents were told that the two other respondents whose work they would see would be anonymous and that their own work would be viewed under anonymous conditions.

Unit two of the Lunar Survival experiment allowed respondents to review the rankings and comments of two other respondents and to review their own solutions to the lunar survival problem. Respondents in the regular standing group condition viewed the products of their regular group members, each associated with the appropriate name. Those in the anonymous group condition viewed the ratings and comments of the two members of their anonymous group, identified only as `Member A' and `Member C'. All respondents then repeated the rating task. This was followed by a series of questions concerning how influenced they felt they were by each of the two other persons whose ratings they had been allowed to view.

Objective scoring of the correctness of respondents' rankings of the fifteen items is possible by comparison with rankings provided by NASA experts using the same scenario. Thus, this task will allow us to assess social loafing effects (comparing standing and anonymous groups) on productivity (both effort and quality of decision) in a decisionmaking task which has obvious military implications.

The literatures on decision-making and computer networking often hypothesize that group decision-making is more efficient under conditions of anonymity--- a notion which contradicts findings in the social loafing literature. This task provides a clear experimental test of these conflicting hypotheses. In addition, because the task includes measures of perceived social influence, these can be compared with measures of actual social influence to provide preliminary information about social influence under conditions of varying anonymity.

Arctic Survival. (Two units.) This task was identical in structure to the Lunar Survival task. Only the scenario and list of fifteen items differed. The purpose of administering this task was to provide a comparison between the social loafing effects on a decisionmaking task affected to at least some degree by prior knowledge (the lunar task, in which prior knowledge about the lunar environment would be expected to vary widely and to influence decisionmaking) and on one in which prior knowledge was of little value (the arctic task, where most relevant information was provided in the scenario itself or could be expected to be more widely shared).

Weight Estimation. (Multiple units. The number completed per respondent varied.) This was a optional task for respondents. After completing the required units in a session, respondents were allowed to choose whether to work on additional units or to end their sessions. In the each weight estimation unit, respondents were told the sex and eight body measurements of fifteen stimulus individuals. Their task was to estimate the weight of the individuals. After each estimate, the correct weight was revealed. Respondents worked alternately under individual and group conditions on this task. Data from these units will allow us to assess the effects of social loafing on a learning task. Variables of interest will be the respondents' initial decision-making strategies and changes in these strategies over time and across individual and group responsibility conditions.

Description of Demographic and Social-Psychological Units

Background Questionnaire. Includes standard demographic information and questions about living conditions and social life on campus.

Cohen-Hoberman Interpersonal Support Evaluation List. Assesses social supports.

Cook and Medley Hostility Scale.

Marlowe-Crowne Social Desirability Scale.

Buss Shyness and Sociablilty Scales.

UCLA Loneliness Scale.

Political Knowledge and Attitudes Questionnaires.

Cultural Cognitions. (Four units.) Measure respondents beliefs about and feelings toward a number of nationalities.

Affect/Decisionmaking Task. This unit was designed to assess the effects of positive affect on decisionmaking strategy. While social loafing was not measured in this unit (since all respondents worked as individuals), information from the unit will allow the design of units to test both possible direct effects of affect on social loafing and possible interaction effects between affect and the other variables which influence social loafing.

In this task, respondents were asked to choose among six hypothetical automobiles about which they had information on nine attribute dimensions (including price, fuel economy, roominess, and maintenance record). Respondents could look at as much or as little of the information as they desired before indicating which automobile they would purchace. The computerized procedures of the study allowed us to record not only how much of the information was used by each respondent, but also in what order and how much time the respondent used to make a decision. Affect was manipulated by a "lottery" which preceeded the decision task. One-third of the respondents won one dollar in the lottery. Another third were informed about the lottery but did not win, and the final third were not told about the lottery. Previous studies have shown that manipulations of this sort do affect decisionmaking strategies. If that finding is replicated with this unit, further research, examining the effects of affect on social loafing might be in order.

Weekly Units: Teleconference and Wrap-Up.

The purpose of the eight teleconference units was to provide a mechanism through which social cohesion, identification, and other properties of real standing groups might be developed in the standing groups of study respondents. The units allowed respondents to send messages to and receive messages from the two other members of their assigned regular groups. Although respondents could opt to send no message at all, we found that few respondents ever chose this option. In fact, communications among group members via the teleconfereces were often lengthy and quite sociable. Respondent reactions indicate that they enjoyed this aspect of the study and would even like opportunities for interaction among respondents to be expanded.

Five of the eight teleconference units were followed by questions designed to assess whether respondents had had contact other than via the teleconferences and to measure group cohesion.

In addition to analysis of the teleconference messages to provide measures of group conhesiveness and other variables which might be related to the motivation of the respondents to perform well on group tasks, analyses might also focus on the development of groups under conditions of mediated interaction, a topic of some practical relevance in view of the growing popularity of computer networking.

Wrap-Up. Each of the eight sessions ended with a wrap-up unit designed to measure the respondents' feelings about the session, their group, the computer, and themselves. This unit also allowed respondents to make open-ended comments about the session and to send comments and/or questions to the experimenter. Such comments and questions were answered by the experimenter at the next session via a special mail system which allows both broadcast messages (from the experimenter to all respondents) and individual messages (to a single respondent) to be viewed by respondents when they sign on the next time.

Data Preparation and Analysis

To date, data from all of the eight sessions administered during the fall semester have been moved to tape. A number of the component units have been converted into SAS data files and readied for analysis. Editing and coding of data are continuing and preliminary analyses are being designed and carried out.

Preparations for Spring Semester

Twelve sessions will be administered during the spring semester. In preparation for those sessions, reminder letters have been mailed to respondents and a number of research units have been designed and readied for administration. Respondents will report during the week of January 9 to complete new schedule forms. Computerized scheduling and notification of respondents will take place during the week of January 16. The first session will begin on January 23.

Respondents have been reassigned to both standing and anonymous groups so that half of the respondents are in same-sex and half are in mixed-sex groups. This will allow us to assess whether group composition affects social loafing.

Papers Presented

Wiggins Beverly B. "The UNC Panel: A New Data Resource for Social Science," IRSS Coloquium Series, Fall, 1983.

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Quarterly Status Report to the Office of Naval Research
December 25, 1983 - May 15, 1984

Title: Increasing Productivity through Social Structure

Contract Identification: N00014-83-K-0279

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Research Activities

This report covers the fourth quarter of the grant period (Dec.25-March 25) and part of the six-month period covered by a no-cost extension. During this period, the data collection phase of the research program was completed. Despite major inconveniences and inefficiencies imposed by limitations of the production computer, the collection process appears to have proceeded smoothly from the point of view of the respondents, and indications are that the resulting data are remarkably complete and of good quality. The performance of the system far exceeded our expectations for a first-year undertaking and resulted in the collection of a much larger quantity of data than initially planned. The additional data will be particularly valuable to our efforts to examine individual differences in social loafing. This report will briefly summarize the major aspects of the spring semester data collection and plans for completion of the 1983-84 research program.

Respondents. Respondents resumed their weekly sessions after the Christmas recess and completed twelve sessions during the spring semester. These sessions included thirteen experimental units designed specifically to test the social loafing effect in the context of decisionmaking, cognitive, and learning tasks along with over seventy units designed to assess the respondents' demographic and social-psychological characteristics. As in the fall semester, teleconference and wrap-up units were administered at each of the twelve weekly sessions.

At the beginning of the spring semester, the ninety-six respondents were reassigned membership in both a standing group and an anonymous group. Each group consisted of three respondents who were not assigned the same appointment time. Unlike the fall semester, when all of the groups were of mixed-

sex composition, half of the respondents were assigned to same-sex groups, producing equal numbers of MMF, FFM, FFF, and MMM groups. Respondents knew the identities of the persons in their standing groups and were given the opportunity at each weekly session to send messages to and receive messages from those persons. The existence of these groups allows us to look at social loafing over time, as the group members become better acquainted with each other, and to compare performance under several conditions-- individual versus group responsibility for performance, and within the group responsibility condition, individual identity versus anonymity. Condition assignments for many of the research units were based on group membership. In all cases, at least one same-sex and one mixed-sex group was assigned to each experimental condition.

Attrition rates for the research program remained surprisingly low. Only seven of the ninety-six respondents were replaced during the twenty-week data collection period. Two respondents were replaced during fall semester because of failure to show up for sessions on time. Three respondents were lost between fall and spring semesters... one due to graduation, one transfered to an off campus program for the semester, and another took a job that conflicted with the study. A final two respondents were lost during the spring semester... one got a full-time job and resigned and the other was dropped due to a failure to show up for sessions as scheduled.

Executive System and Supporting Programs. The experimental executive system was designed to manage the administrative problems associated with running a large number of subjects in a complex experimental program. The automated system assigned subjects to research tasks, administered and monitored those tasks, organized the data files for analysis, and provided both an electronic mail system for experimenter-subject and subject-subject communication and an accounting system for keeping track of subject earnings. We believe that the existence of this well-designed executive system allowed for the smooth operation of the research program with a larger number of subjects and a smaller number of staff than would otherwise have been possible.

Refinements made to the project's executive system during the Christmas break allowed for more efficient use of the two task lists used to control the administration of tasks to respondents. One list contains the required tasks for each session and the other contains optional tasks. During the fall semester, the respondents were given the option to end their session after the required tasks or to do additional tasks. During the spring, the option to stop was replaced by an automatic continuation to the optional tasks, as long as the respondent had not been logged on for more than a specified time limit (usually 50 minutes). This system made the best possible use of the available respondent time. Task variety was increased greatly and seemed to contribute positively to the respondents' enjoyment of sessions. In the fall, only one type of task was included in the optional list and respondents seemed to tire of

it after a few weeks. Since they had the option to stop a session without going to the optional list, many respondents reduced the amount of optional work done over the course of the fall semester. The revised procedure allowed respondents to work through the list at their own pace, and most finished the optional list over the course of the twelve-week spring semester. Those who did not were asked to come in for an extra session to finish it, so that complete data are available for all respondents.

Also developed for the 1983-84 program of research was a support program for the construction of questionnaire modules. This program allowed the construction of questionnaires including branching and answer-validity checking without the use of a complex programming language. Thus, the preparation of such units could be completed by less-skilled staff, freeing the project's two full-time programmers for the development of more complex units requiring sophisticated systems analysis and programming skills. More than thirty questionnaire modules were developed and administered using this program in 1983-84.

Improvements were made to both the executive system and questionnaire support program during the 1983-84 data collection. Based on our experience over that twenty-week period, additional improvements have been suggested. Revisions to incorporate these improvements are already underway and should be in place and tested before data collection resumes in the fall of 1984.

Equipment. As noted in our last report, the major limiting factor in the project proved to be the Data General Eclipse S/140 minicomputer which was used as the production machine. Although it operated very reliably and shows great promise for other research areas amenable to computer-mediated experiments and questionnaires, the complexity of the executive system and the volume of subject sessions taxed the capacity of this lower-level machine. Frequently, as many as four respondents and four programmers all used the system at the same time.... the respondents to complete weekly sessions and the programmers to do programming for research units and system maintenance. In such cases, response time was very slow and interfered with both the timely completion of data collection and the development of experimental task programs. Slow response time during sessions was one of the respondents' few complaints about the project.

While some problems were encountered during the fall, the improved efficiency afforded by the above-noted change in the executive system increased the amount of data collected per session in the spring and magnified the problems associated with exceeding the capacity of the 25 megabyte disk. During the twelve-week spring data collection, disk capacity was exceeded every week. Because of this, data had to be dumped to tape once or twice weekly, increasing the data management tasks involved with keeping track of and merging data sets. In addition, because the disk space was so limited, there was no disk capacity available for doing the necessary processing of the data prior to

dumping. This necessitated moving all of the data off of the disk and loading it back on, piecemeal, for processing and dumping. In short, the limitations of the project hardware greatly increased the number of personhours devoted to tasks that, with adequate hardware, would have been unnecessary. A recently awarded DoD instrumentation grant will provide funds for upgrading the system to eliminate these problems in future data collection efforts.

Description of Social Loafing Units

Wordgames. (Two units.) This anagrams task instructed respondents to make words of four or more letters from four stimulus words (two per unit). In each unit, respondents worked under two of three instruction conditions-- individual, anonymous group, and standing group. The order of the instruction conditions and words as well as the difficulty of words were varied. Half of the respondents worked under an incentive condition. For each stimulus word, they were told that the nine individuals and members of three groups who scored the highest on the task would receive an extra $3.00 bonus.

The task differed from the wordgames task given in the first semester in several respects. The contingent monetary incentive allows us to study the question of the effects of material incentives on the magnitude of social loafing. In addition, respondents were led to believe that their part of the group task was unique to them. This provides a test of the hypothesis that social loafing is due to the perceived redundancy of effort in group tasks.

Brainstorm. (Two units.) In each unit of this task, respondents were asked to generate uses for two objects (either a can and a brick, or an out-of-date telephone directory and a toothpick). In each unit, half of the respondents worked on one item under the individual condition (told that their individual score would be recorded) and one item under the standing group condition (told their score would be averaged with the scores of their regular group members and the group score recorded). The other half of the respondents worked on one item under the individual condition and the other under the anonymous group condition (told that their score would be averaged with the scores of two other unidentified respondents and the group score recorded). The order of presentation of condition assignments and stimulus objects was varied.

Because this task involves more creativity than did the wordgames task, it will be possible to assess the effect of task type on social loafing. In the fall, respondents were told that the <u>number</u> of ideas they generated was the important factor in the brainstorming tasks. In the spring, they were told that the <u>creativity</u> of their ideas would be judged and that <u>creativity</u>, not quantity, was the important factor. This change in

instructions will allow us to assess the differential effects of social loafing on optimizing vs maximizing tasks.

Brainstorm Judging. (Two units.) In order to produce objective scores for the above brainstorming tasks, respondents were presented with the ideas of their two regular group members and their two anonymous group members and were asked to judge the creativity of those ideas individually and as sets (a single person's ideas for an object). The respondents were not told whose ideas they were judging and had no way to learn the identity of the persons whose ideas they judged or the persons judging their own ideas. The ratings produced in this manner provide objective creativity scores for the brainstorm tasks.

A few additional features were added to the brainstorm judging task in order to make it usable, in its own right, as a test of the social loafing hypothesis. First, to the eight sets of real brainstorming ideas (generated by the respondent's regular group and anonymous group members for two objects per unit), one bogus set of ideas per object was added to the judging task. These bogus ideas provide a standard set of stimuli that were rated by all respondents. Second, the brainstorming ideas were rated under two conditions, with each respondent rating half of the ideas presented to him or her under each condition. In the first condition, respondents were told that they alone were judging the creativity of the ideas before them. In the second condition, they were told that they shared the responsibility for judging the creativity of the ideas with five other judges. With this design, it will be possible to assess the effects of the perception of shared responsibility on the creativity ratings assigned to the standard stimuli. Will, for example, respondents tend to be more lenient or less lenient in their judging when they think that they alone are responsible for someone else's score?

Wordmatches. (Two units.) In the wordmatches task, respondents are presented with a series of word pairs. After viewing the entire list, they are shown the first word in the pair and have eight seconds to respond with the appropriate match. Once they have responded, or when the eight-second limit is up, they are shown the correct match and the next stimulus word appears on the screen. The wordlist is repeated five times in random order (twice for the practice wordlist). One practice set and two regular wordlists were presented per unit. In each unit half of the respondents worked as individuals and half with members of their regular groups, with this condition reversed in the second unit so that all respondents worked in both conditions. In each unit, one wordlist was easy, consisting of pairs of similar words, and the other difficult, consisting of pairs of dissimilar words, with similar words in the list but not matched. Again, the major question to be addressed is the effect of task difficulty on loafing in a learning task. Based on previous findings, an interaction effect between task difficulty and social loafing is expected. Rate of learing will be the major dependent variable.

Restaurant Choice. (Two units.) In each of the restaurant choice units, respondents were presented with a matrix of information about five restaurants (named with letters only). The information available included average price per meal, service rating, atmosphere rating, taste rating, and type of food (American, Italian, etc.). Respondents were told that they were to choose which restaurant to go to that evening under one of four hypothetical situations. In two of those situations, respondents were to assume that they alone were to choose a restaurant for the evening meal which would be attended by either their regular CAPS group or their regular CAPS group plus three other CAPS respondents. In the other two situations, respondents were told to assume that they shared the responsibility for choosing a restaurant with the other two members of their regular CAPS group and that the meal would be attended by either their regular CAPS group or that group plus three other CAPS respondents. This will allow us to examine the effects of both shared responsibility for the decision and the number of persons affected by the decision, which, according to social impact theory, should influence the perceived importance of the decision. Dependent measures for this task will include the number of items and pattern of information searched and the amount of time spent before making the decision. Respondents are also asked to rate the importance of the various items of information for making the decision, so these effects may be controlled.

Hiring. (One unit.) In this task, respondents were asked to assume that they were the director of the programming unit of a small computer company. Their task was to evaluate fourteen applicants for a new and important position in their unit based on the recommendations of twelve current employees. Brief descriptions of each of the twelve employees were given. Half of the descriptions depicted high-status, competent employees and the other half, low-status, undesirable employees. Each employee recommended two applicants for consideration for the new position and against two other applicants. (The assignment of applicants' names to patterns of for and against recommendations was randomized to avoid possible name effects.) In one condition, respondents were told that they alone were responsible for selecting the applicant to be hired. In the other condition, they were told that they shared responsibility for the decision with nine other executives. We will examine whether respondents in the two decision conditions made different choices about who to hire, and, if so, <u>how</u> these decisions differed.

Shouting. (One unit.) This unit was one of two non-computer units designed to assess social loafing effects on tasks requiring physical effort. The task was originally used in Latane', Williams, and Harkins (1979) and has now been replicated many times in a number of cultures. In the task, respondents were taken in pairs to a special room, where they were told that they would be participating in an study about the effects of reduced feedback on noise production. After an explanation of the procedures to be followed, respondents put earplugs or

cotton-balls in their ears, put on blindfolds and headsets and were given instructions via tape recording. These instructions told the respondents (who had been assigned a color, red or green) to shout or clap as loudly as possible, on cue, either alone or with the other respondent. Actually, the respondents were hearing different tracks of the tape, and were almost always shouting or clapping alone, even though they thought they were performing sometimes alone and sometimes with the other person. Previous administrations of this task have demonstrated that subjects shout and clap less loudly when they believe that they are doing so with another person. This hypothesis will be reexamined here and also looked at with respect to individual consistency in loafing across various types of tasks.

Counting. (One unit.) This task, the second non-computer loafing task administered to project respondents, differs from the shouting task in two important ways. First, it is more intrinsically motivating since it is seen by respondents as a more skill-related task, and second, it is more difficult. Used previously by Gabrenya, Latane' and Wang, the procedure has respondents seated next to each other, but separated by a partition. Both respondents, again assigned either red or green, along with an experimenter, have headphones attached to a stereo tape recorder. After initial instructions, which explain that the experimenter is interested in how well subjects can perform a difficult auditory task, there is a practice period to make sure that subjects can distinguish the three types of sound (right only, left only, and both) and properly signal to the experimenter how many sounds they have heard. The practice is followed by ten trials during which respondents may both be told to count the same two types of tones together, one respondent may be told to count two types of tones alone and the other respondent to take off the headphones for that trial, or both respondents may be told to count one type of tone together and each to count a different type of tone alone. Respondents hold up fingers to indicate to the experimenter how many of each of two types of tones they have heard. The trials are of equal difficulty, so that it will be possible to compare alone and together trials to see whether respondents make fewer errors on one type or the other. It will also be possible to compare the alone and together performances on the "choice" trials in which respondents count one type of tone under the alone condition and another type under the together condition within the same trial. Previous research has demonstrated a loafing effect when comparing alone and together trials, but not on choice trials.

Description of Demographic and Social-Psychological Units

In addition to the social loafing units described above, respondents completed over seventy other units during the spring semester. These units included demographic and background information, a number of psychological and attitudinal scales, questions about political orientation and use of time and money, and measurements of gender stereotypes. The existence of this

unusually large amount of information about the respondents will allow the exploration of individual differences in social loafing and the examination of possible interaction effects between individual characteristics and task characteristics as they affect social loafing.

Three of the social psychological scales administered to the respondents were administered both via the computer and in paper-and-pencil form. This will allow us to assess whether any differences appear to result from the method of administration and, if so, their implications for computer-administered research.

Weekly Units: Teleconference and Wrap-Up.

The purpose of the weekly teleconference units was to provide a mechanism through which social cohesion, identification, and other properties of real standing groups might be developed in the standing groups of study respondents. The units allowed respondents to send messages to and receive messages from the two other members of their assigned regular groups. Although respondents could opt to send no message at all, we found that few respondents ever chose this option. In fact, communications among group members via the teleconfereces were often lengthy and quite sociable. Respondent reactions indicate that they enjoyed this aspect of the study and would even like opportunities for interaction among respondents to be expanded.

Several of the teleconference units were followed by questions designed to assess whether respondents had had contact other than via the teleconferences and to measure group cohesion.

In addition to analysis of the teleconference messages to provide measures of group conhesiveness and other variables which might be related to the motivation of the respondents to perform well on group tasks, analyses might also focus on the development of groups under conditions of mediated interaction, a topic of some practical relevance in view of the growing popularity of computer networking.

Wrap-Up. Each of the weekly sessions ended with a wrap-up unit designed to measure the respondents' feelings about the session, their groups, the computer, and themselves. This unit also allowed respondents to make open-ended comments about the session and to send comments and/or questions to the experimenter. Such comments and questions were answered by the experimenter at the next session via a special mail system which allows both broadcast messages (from the experimenter to all respondents) and individual messages (to a single respondent) to be viewed by respondents when they sign on the next time.

Data Preparation and Analysis

To date, data from all of the twenty sessions administered during the two semesters have been moved to tape. A number of the component units have been converted into SAS data files and readied for analysis. Editing and coding of data are continuing and preliminary analyses are being designed and carried out.

A number of the analyses now underway will be presented at professional meetings during the summer months. By the end of 1984, the results of the analyses will be summarized in a series of five technical reports to be presented to ONR. See Attachment A for outlines of those reports.

Preparations for 1984-85 Data Collection

In early May, we were notified that we would receive funding from DoD's research instrumentation program for the purchase of a Data General Eclipse MV/4000 and related equipment to continue the research program. This configuration will provide a logical and cost-effective upgrade in computing power that will allow the system developed thus far to be used to its fullest potential. Revisions now being made to the executive system and support programs are being undertaken with this upgrade in mind, so that conversion to the new system should cause few problems. It is likely that acquisition of the new equipment will not be completed until well after the resumption of data collection in the fall semester, so conversion will probably take place during the summer following the 1984-85 data collection. Because of this likelihood, additional disk capacity and an upgraded programming language for the current production machine have been ordered and will be in place before the fall. Even these temporary improvements are expected to significantly reduce the kinds of problems encountered in 1983-84 and to dramatically improve the efficiency of data collection.

As analysis of the data proceeds, additional research questions are being developed. A continued program of reseach on social loafing appears very promising and a proposal seeking funding for such a continuation has been developed for submission to ONR. It is our hope that the improved resources afforded by the DoD equipment grant and our own experience in the past year's data collection effort can be applied to increase our basic understanding of social loafing and its implications for modern organizations.

Papers Presented

Barefoot, John, "Gender Differences in Social Loafing," First Invitational Conference on Sex and Gender, Nags Head Conference Center, May 6-11, 1984.

Barefoot, John, Latane', Bibb and Wiggins, Beverly "Social Loafing: Past and Present Research," Organizational Research Group, Department of Psychology, January 23, 1984.

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APPENDIX B

Many Hands Make Light the Work: Social Loafing as a Social Disease

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"Many hands make light the work"

Contents

Summary

An unpublished experiment that has not perished is the classic study by Ringelmann, reported only in summary form by Moede in 1927 in German, but cited and analysed by many scientists. In that experiment, the collective group performance of co-workers pulling on a rope was less than the sum of their individual performances, with dyads pulling at 93% of their individual capability, trios at 85% and groups of eight at only 49%. As the old saw has it, "Many hands make light the work."

In a recent replication, groups of six undergraduate males were asked to make as much noise as possible either by shouting or clapping hands, alone, in pairs, and in groups of six. As in pulling ropes, it appears that when it comes to clapping and even shouting out loud, many hands do in fact make light the work: the sound of twelve hands clapping was only about three times as loud as the sound of two. Part of this deficit may be attributed to the fact that sound waves tend to cancel each other out, reflecting one form of faulty coordination of social effort. Another part, however, may be due to the fact that participants did not shout as loud or clap as hard in groups as they did when alone, a process we call "social loafing."

Individuals in a second experiment shouted in "pseudogroups" in which they believed that others were yelling with them, but actually yelled alone. This change eliminates coordination loss as a factor, allowing social loafing to be measured directly. Consistent with the view that pressures to work hard in groups are diffused, individual effort decreased as pseudogroup size increased.

Either of two possible strategies could explain this outcome: an allocational strategy whereby people work as hard as they can overall but conserve their strength for individual trials where work is personally beneficial, and a minimizing strategy, whereby the primary motive is to "get by" with the least possible effort possible. However, an allocational strategy would lead participants who work always in groups to put out as much effort as participants who work solely alone, since there is no need to husband strength. An additional experiment with the sound production task found social loafing even under these conditions, suggesting that allocational strategies are not prevalent. Social loafing seems to occur when people perform together in groups whether or not they must also perform alone.

Two experiments tested the extent to which the identifiability of one's individual output moderates social loafing. In the first stage of Experiment 5, participants were asked to produce noise either alone or believing that one or five other people were shouting with them. In the second stage, these same people were led to believe that their outputs would be identifiable even when they cheered in groups. This manipulation eliminated social loafing. Experiment 6 demonstrated that when individual outputs are always identifiable (even in groups), people exert consistently high levels of effort, and if their outputs are never identifiable (even when alone), they consistently exert low levels of effort across all group sizes. Therefore, identifiability is an important mediator of social loafing.

The present paper reports seven experiments designed to determine the causes and the consequences--and to investigate some possible cures--of social loafing. The effects of variables such as group cohesiveness and identifiability of individual output are explored. Implications of the findings are discussed with respect to productivity in such settings as the Russian collective farm or kolkhoz, the Israeli kibbutz, university swimming and football teams, factory decision-making committees, and air traffic control centers. Directions for future research are also suggested.

Chapter One
The Sound of Twelve Hands Clapping

In the last few years, economists, politicians, journalists, and the general public have successively become aware of and concerned about declines in the rate of growth of the productivity of the American workforce. Many have pointed to insufficient productivity as a cause of increasing inflation, decreasing value of the dollar, and our declining world stature.

Many factors undoubtedly contribute to lessened productivity gains. Some analysts focus on the behavior of our leadership, suggesting that we may not be plowing enough money into research and development or new and improved labor-saving devices. Other analysts focus on the behavior of workers themselves. One view would have it that large increases in the number of relatively inexperienced young people in the workforce have led to decreases in the average level of competence. More pessimistically, lowered productivity may simply reflect a reduction in effort by individuals.

There is an old saying that "many hands make light the work." This saying is interesting for two reasons. First, it captures one of the promises of social life--that with social organization people can fulfill their individual goals more easily through collective action. When many hands are available, people often do not have to work as hard as when only a few are present. The saying is interesting in a second, less hopeful way--it seems that when many hands are available, people actually work less hard than they ought to.

Over fifty years ago a German psychologist named Ringelmann did a study which he never managed to get published. In rare proof that unpublished work does not necessarily perish, the results of that study, reported only in summary form in German by Moede (1927), have been cited by Dashiell (1935), Davis (1969), Kohler (1927), and Zajonc (1966) and extensively analyzed by Steiner (1966, 1972) and Ingham, Levinger, Graves and Peckham (1974). In fact, the study seems to have survived almost intact, although some of the experimental details and Ringelmann's first name have been lost to history.

Apparently Ringelmann simply asked German workers to pull as hard as they could on a rope, alone or with one, two or seven other people, and used a strain gauge to measure how hard they pulled in kilograms of pressure. This task requires heavy muscular work on the part of the participants. The fact that output is expressed in standard physical units comprising a ratio scale makes the task of analysis much lighter.

Rope pulling is in Steiner's (1972) useful classification of tasks, maximizing, unitary, and additive. For a maximizing task, success depends on how much or how rapidly something is accomplished, and presumably on how much effort is expended, as opposed to an optimizing task where precision, accuracy or correctness are paramount. A unitary task cannot be divided into separate subtasks--all members work together doing the same thing and no division of labor is possible. In an additive task, group success depends upon the sum of the individual efforts, rather than on the performance of any subset of members.

From these characteristics, we should expect three people pulling together on a rope with perfect efficiency to be able to exert three times as much force as one person, and eight people to exert eight times as much.

Ringelmann's results, however, were strikingly different. When pulling one at a time, individuals averaged a very respectable 63 kg. of pressure. Groups of three people were able to exert a force of 160 kg., only two and a half times the average individual performance, and groups of eight pulled at 248 kg., less than four times the solo rate. Thus the collective group performance, while increasing somewhat with group size, was substantially less than the sum of their individual efforts, with dyads pulling at 93% of the sum of their individual efforts, trios at 85% and groups of eight at only 49%. In a way somewhat different from how the old saw would have it, many hands apparently made light the work.

The Ringelmann effect is interesting because it seems to violate both common stereotype and social psychological theory. Common stereotype tells us that the sense of team participation leads to increased effort, that group morale and cohesiveness spur individual enthusiasm, that by pulling together, groups can achieve any goal, that in unity there is strength. Social psychological theory holds that, at least for simple, well-learned tasks involving dominant responses, the presence of other people, whether as co-worker or spectator, should facilitate performance. It is thus important to find out whether Ringelmann's effect is replicable and whether it can be obtained with other tasks.

The Ringelmann effect is interesting for a second reason: if it represents a general phenomenon and is not restricted to pulling on a rope, it poses the important theoretical question as to when and why collective efforts are less efficient than individual ones. Since many components of our standard of life are produced through one form or another of collective action, this theoretical question has practical consequence. Research identifying the causes and conditions of inefficient group output and suggesting strategies to overcome these inefficiencies is clearly desirable.

For these and other reasons, we decided to initiate a program of research into the collective performance of individuals in groups.

Experiment 1:
Clap Your Hands and Shout Out Loud*

One of the disadvantages of Ringelmann's rope pulling task is that the equipment and procedures are relatively cumbersome and inefficient. Therefore, we decided to keep our eyes open for other tasks which would allow us conceptually to replicate the Ringelmann finding and provide the basis for extended empirical and theoretical analysis. We chose cheering and clapping, two activities people commonly do together in social settings and which are maximizing, unitary and additive. As with rope pulling, output can be measured in simple physical units which comprise a ratio scale.

*Experiment 1 is reported in somewhat greater detail in Latane, Williams and Harkins (1979).

Method

On Saturday afternoons during a typical fall, thousands of people crowd into college football stadiums and shout and clap as loudly as they can. On weekday evenings during a recent winter, eight groups of six undergraduate males gathered in the psychology laboratories located under the stands of the stadium of a midwestern university and were asked to do the same.

Participants were seated in a semicircle spaced one meter apart in a large soundproofed laboratory and told, "We are interested in judgements of how much noise people make in social settings, namely cheering and applause, and how loud they seem to those who hear them. Thus, we want each of you to do two things: 1)Make noises; and 2)Judge noises." They were told that on each trial, "the experimenter will tell you the trial number, who is to perform and whether you are to cheer (Rah) or clap. When you are to begin, the experimenter will count backwards from three and raise his hand. Continue until he lowers it. We would like you to clap or cheer for five seconds as loud as you can."

After some practice at producing noise, there were 36 trials of yelling and 36 trials of clapping. Within each modality, each person performed twice alone, four times in pairs, four times in groups of four, and six times in groups of six. These frequencies were chosen as a compromise between equating the number of occasions on which we measured people making noise alone or in groups (which would have required more noisemaking in fours and sixes) and equating the number of individual performances contributing to our measurements in the various group sizes (which would have required more noisemaking by individuals and pairs). We also arranged the sequence of performances to space and counterbalance the order of conditions over each block of 36 trials, while making sure that no one had to perform more than twice in a row.

Performances were measured with a General Radio sound-level meter, model 1565A, using the C scale and the slow time constant, that was placed exactly four meters away from each performer. The C scale was used so that identical loudnesses varying only in frequency or pitch would be recorded as equally loud. The slow time constant allowed easier recording of performances as the needle was less sensitive to momentary fluctuations.

The output of present day sound level meters is given in decibel (dB) units. The decibel scale of measurement represents sound output in terms of bels--the logarithm of the ratio of the sound power actually measured and a reference level of .0002 representing the absolute threshold of hearing. A decibel is one-tenth of a bel. Named after Alexander Graham Bell and based on Fechner's logarithmic law of psychophysics, the decibel scale is intended to approximate the human reaction to sound.

For our purposes, however, the appropriate measure is the effort used in generating noise, not how loud it sounds. The physical unit of sound pressure is the dyne, the amount of force that produces an acceleration of one centimeter per second per second on a mass of one gram. The corresponding unit of work done or energy transferred is the dyne/cm2, a unit of power. We transformed our decibel measures into dynes/cm2.

Because people shouted and clapped in full view and earshot of each other, each person's performance could affect and be affected by the others. For this reason, the group was the unit of analysis, rather than the individual, and each score was based on the average output per person. Results were analyzed in a 4 x 2 x 2 analysis of variance, with group size (1, 2, 4, 6), response mode (clapping vs shouting) and replications (1, 2) as factors.

Results

Participants seemed to adapt to the task with good humor if not great enthusiasm. Nobody refused to clap or shout even though a number seemed somewhat embarrassed or shy about making these noises in public. Despite this, they did manage to produce a good deal of noise. Individuals averaged 84 decibels clapping and 87 cheering, while groups of six clapped at 91 decibels and shouted at 95. To put these levels in context, the noise level of crowds from a goal line seat in Ohio Stadium averages 76 decibels for background noise between plays and reaches 104 decibels for touchdowns and interceptions by the home team. Unlike the sounds at football games, experimenters found the noise produced by groups of six to be somewhat aversive, expecially as time went on.

As might be expected, the more people clapping or cheering together, the more intense the noise and the more the sound pressure produced. However, it did not grow in proportion to the number of people. Pairs made 1.4, foursomes 2.0, and groups of six only 2.4 times as much noise as single individuals. These data can be perfectly described by a power function with an exponent of .5: the sound produced by persons yelling and clapping grows only as the square root of the number of people yelling and clapping. If general, this result is fortunate for those of us who spend a lot of time in footbal stadiums--it means the noise produced by 90,000 fans should only be about 300 times as loud as that produced by one.

Although the total noise produced increased with more people, the average sound pressure generated per person decreased with increasing group size, $F(3,21) = 41.5$, $p<.001$. This factor alone accounts for 58% of the total variance in sound production. People average about 3.7 dynes/cm2 alone, 2.6 in pairs, 1.8 in foursomes and about 1.5 in groups of six. Put another way, two-person groups performed at only 71% of the sum of their individual capacity, four person groups at 51% and six person grops at 40%. As in pulling ropes, it appears that when it comes to clapping and shouting out loud, many hands do, in fact, make light the work.

People also produced about 60% more sound power when they shouted than when they clapped, $F(1,7) = 8.79$, $p<.01$, accounting for 30% of the variance. People yelled an average of about 3.02 dynes/cm2 and clapped at 1.74 dynes/cm2. This difference presumably reflects physical capacity rather than any psychological process.

There was no effect due to blocks of trials indicating that subjects needed little or no practice and that their performance was not deleteriously affected by fatigue. In addition, there

were no interactions among the variables. Figure 1 presents the results graphically.

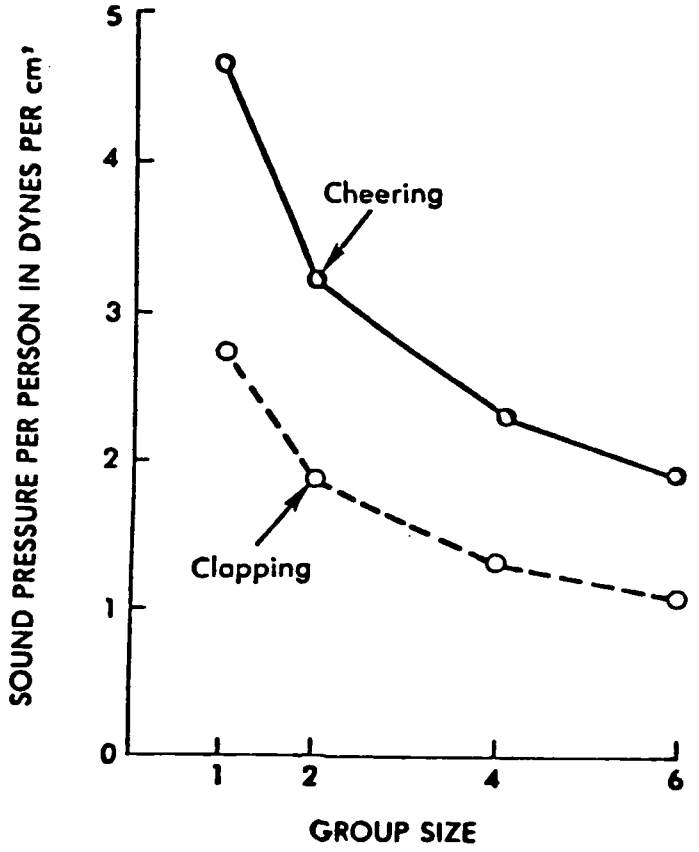

Figure 1. Intensity of noise as a function of group size and response mode. Experiment 1.

Group norms. In running this study we noticed that individuals within each group seemed surprisingly similar one to another in how much nose they made. It was as though the first efforts established a norm for sound production and that afterwards everyone tried to conform to this norm. To test this observation, we entered only the sound outputs of individuals performing alone in an analysis of variance. The within-group variance was significantly less than the between group norms. In addition, while some groups tended to produce nearly as much noise when they clapped, yielding a Group X Response Mode interaction $F(7, 40) = 4.09$, $p<.01$. This suggests that groups adopted differing norms for clapping and shouting.

Thus it appears that something akin to group norms developed, with people's own output being affected by the output of the other people in their group. After the first few performances, people appeared to control their sound outputs so that no one would produce more noise than that of the loudest

previous output which, perhaps because of the possibly embarrassing nature of the tasks, were rather unambitious attempts. For this reason, we suspect that our yellers and clappers were not performing to capacity, even when performing alone. This effect of social norms, combined with the additional effects of social loafing and incoordination, resulted in a greatly submaximal level of performance in groups. This evidence of nonindependence in the behavior of group members, however, supports our use of the group as the unit of analysis for testing the effects of response mode and group size.

Discussion

The results provide a strong replication of Ringelmann's original findings using a completely different task and in a different historical epoch and culture. At least when people are making noise as part of a task imposed by someone else, voices raised together do not seem to be raised as much as voices raised alone, and the sound of twelve hands clapping is not even three times as intense as the sound of two. Although common stereotype would have us believe that "in unity there is strength," the results of Experiment 1 suggest that people don't necessarily accomplish more in groups, at least when it comes to clapping and shouting. Although it might appear that performing in groups led to a drop in individual performance there is an alternative explanation. It may be, not that people exert less effort in groups, but that the group product suffered as a result of group inefficiency.

Chapter Two
Incoordination or Inadequate Motivation?

In his invaluable theoretical analysis of group productivity, Ivan Steiner (1972) suggests that the discrepancy between a group's potential productivity (in this case N times the average individual output) and its actual productivity may be attributed to faulty social process. In the case of Ringelmann's rope pull, Steiner identifies one source of process loss as inadequate social coordination. As group size increases, the number of "coordination links," and thus the possibility of faulty coordination (pulling in different directions at different times) also increases. Steiner shows that for Ringelmann's original data the decrement in expected productivity is exactly proportional to the number of coordination links.

Ingham, Levinger, Graves and Peckham (1974) designed an ingenious experiment to determine whether the process losses found in rope pulling were mainly due to problems with coordinating individual efforts and the physics of the task or whether they resulted from reductions in personal exertion (what we have called "social loafing"). First, they conducted a careful replication of Ringelmann's original rope pulling study and found virtually identical results--dyads pulled at 91% of the sum of their individual capacities, trios at 82% and groups of six at only 78%.

In a second experiment, Ingham et al cleverly arranged things so that only the individual's perception of group size was varied. Individuals were blindfolded and led to believe that others were pulling with them, but, in fact, they always pulled alone. Under these conditions, of course, there is no possibility of loss due to faulty synchronization. Still there was a substantial drop in ouput with increases in perceived group size: individuals pulled at 90% of their alone rate when they believed one other person was also pulling, and at only 85% with two to six others believed pulling. It appears that virtually all of the performance decrement in rope pulling can be accounted for in terms of reduced effort. We call this reduction in effort when performing in groups "social loafing."

With respect to clapping and especially shouting, there are several possible sources of coordination loss, physical and psychological, which might have operated in addition to social loafing. 1) Sound cancellation will occur to the extent that sound pressure waves interfere with each other, 2) directional coordination losses will occur to the extent that voices are projected toward different locations, and 3) temporal coordination losses will occur to the extent that moment-to-moment individual variations in intensity are not in synchrony.

In the case of two pure tones with the same frequencies, the sound pressure level resulting from their combination should equal $A2 + B2 - 2AB \cos C$, where A and B are their individual intensities and C is their phase angle. If the tones are perfectly in phase, there should be perfect additivity and no coordination loss. If the tones are perfectly out of phase, there should be complete cancellation and no resulting sound. The formula

grows more complicated and becomes a mere approximation when, as in the present experiment, one deals with noises rather than pure tones. However, it is certainly not inconsistent with the possibility that most or all of the social decrement in noise production in Experiment 1 resulted from a rather mechanical form of coordination loss. Our second experiment was designed to assess the relative effects of coordination loss and social loafing in explaining the failure of group cheering to be as intense as the sum of individual noise outputs.

Experiment 2: Coordination Loss or Reduced Effort*

Despite the powerful results we found in the first experiment, we had the feeling that many participants, especially when performing alone, were not producing up to capacity. Several complained that they felt embarrassed or inhibited. As our analysis of within- vs. between-group variance indicates, individuals seemed to be responding to social pressures to achieve a group standard. In order to eliminate the influence of such norms, as well as for reasons described in the next paragraph, we arranged things so that people could not hear each other shout; participants were asked to wear headphones and during each trial, a constant 90 dB recording of six people shouting was played over their earphones, ostensibly to reduce auditory feedback and to signal each trial.

For this second experiment, we wanted a situation where individuals could be led to believe they were shouting in groups while actually shouting alone. Ingham et al. accomplished this through the use of "pseudosubjects," confederates who pretended to be pulling with the participants but who in fact did not pull any weight at all. Unfortunately this is an expensive procedure--each of the 36 participants tested by Ingham et al. required the services of five pseudosubjects as well as the experimenter. Fortunately, we were able to devise a procedure whereby on any given trial, one person could be led to believe that he was performing in a group, while the rest thought he was performing alone. Thus, we were able to test six real participants at one time.

Additionally, although we find the interpretation offered by Ingham et al. plausible and convincing, the results of their second experiment are susceptible to an alternative explanation. When participants were not pulling the rope, they stood and watched the pseudosubjects pull. This would lead people accurately to believe that while they were pulling the rope, idle participants would watch. Thus, as the number of performers decreased, the size of the audience increased. According to Cottrell's evaluation apprehension interpretation (1972) of Zajonc's (1965) theory of social facilitation, the presence of an evaluative audience should enhance performance for a simple, well-learned task such as rope pulling, and, although there is little

*Experiment 2 is reported in somewhat greater detail in Latane, Williams and Harkins (1979).

supportive evidence, it seems reasonable that the larger the audience, the greater the enhancement (Martens & Landers, 1969; Seta, Paulus, & Schkade, 1976). Thus, it is not clear whether there was a reduced effort put forth by group members because they believed other people were pulling with them, or an increase in the effort exerted by individuals because they believed other people were watching them.

Our second experiment adopted a strategy similar to that of Ingham et al. to see how much of the group decrement in sound production can be attributed to coordination loss and how much to decreased effort on the part of individuals. The strategy differed in that we were able to hold the size of the audience constant even while varying the number of people working together.

Method

Six groups of six male undergraduate volunteers heard the following instructions:

"In our experiment today we are interested in the effects of sensory feedback on the production of sound in social groups. We will ask you to produce sounds in groups of one, two, or six and we will record the sound output on the sound level meter that you can see here in front. Although this is not a competition and you will not learn your scores until the end of the experiment, we would like you to make your sounds as loud as possible. Since we are interested in sensory feedback we will ask you to wear blindfolds and earphones and, as you will see, will arrange it so that you will not be able to hear yourself as you shout."

"We realize it may seem strange to you to shout as loud as you can, especially since other people are around. Remember, that the room is soundproofed and that people outside the room will not be able to hear you. In addition, because you will be wearing blindfolds, and headsets, the other participants will not be able to hear you or to see you. Please, therefore, feel free to let loose and really shout. As I said, we are interested in how loud you can shout and there is no reason not to do your best. Here's your chance to really give it a try. Do you have any questions?"

Once participants had donned their headsets and blindfolds, they went through a series of 13 trials in which each person shouted four times in a group of six, once in a group of two, and once by himself. Before each trial they heard the identification letters of those people who were to shout.

Interspersed with these trials were twelve trials, two for each participant, in which the individual's headset was switched to a separate track on the stereophonic instruction tape. On these trials, everybody else was told that only the focal person would shout, but that individual was led to believe either that one person would shout with him, or that all six would shout.

Thus, each person shouted by himself, in actual groups of two and six, and in pseudogroups of two and six, with trials arranged such that each person would have approximately equal rest periods between the trials on which he performed. Each trial was preceded by the specification of who was to perform. The yells were coordinated by a tape recorded voice counting

backwards from three, followed by a constant 90dB five-second recording of the sound of six people shouting. This background noise made it impossible for performers to determine whether or how loudly other people were shouting, or, for that matter, to hear themselves shout. Each trial was terminated by the sound of a bell. This sequence of 25 trials was repeated three times, for a total of 75 trials in the course of which each subject shouted 24 times.

As in Experiment 1, the data were transformed into dynes/cm and subjected to analyses of variance with the group as the unit of analysis and each score based on the average output per person. Two separate 3 x 3 ANOVA'S with group size (1,2,6) and trial blaock (1-3) were run, one on the output of trials where groups actually shouted together, and one on the pseudogroup trials where only one person actually shouted.

Results

Overall, participants shouted with considerably more intensity in Experiment 2 than in Experiment 1, averaging 9.22 dynes/cm2 when shouting alone as compared to 4.73 dynes/cm2, $t(12) = 4.05$, $p<.01$. There are several plausible reasons for this difference. The new rationale involving the effects of reduced sensory feedback may have interested or challenged individuals to perform well. The constant 90 dB background noise may have led people to shout with more intensity just as someone listening to music through headphones will often speak inappropriately loudly (the Lombard reflex). Performers may have felt less embarrassed since the room was soundproof and the others were unable to see or hear them. Finally, through eliminating the possibility of hearing each other, individuals could no longer be influenced by the output of the others, thereby lifting the pressure of social conformity. Unlike Experiment 1, there were no differences in within- vs between-group variance, $F(5, 30) = .32$, $p = .89$, evidence that we successfully prevented the development of group norms. We suspect the absence of norms against shouting loudly may have been the major factor behind the greater sound pressure levels obtained in Experiment 2.

As in Experiment 1, as the number of actual performers increased, the total sound output also increased, but at a slower rate than would be expected from the sum of the individual outputs. Actual groups of two shouted at only 66% of capacity and groups of six at 36%, $F(2, 10) = 226$, $p,.001$, accounting for 75% of the variance. The comparable figures for Experiment 1 are 71% and 40%. These similarities between experiments suggest that our procedural changes, even though they led to the elimination of group norms and made people unable to hear or see each other, did not eliminate their feelings of being in a group or reduce the amount of incoordination or social loafing.

The line connecting the solid circles in Figure 2 shows the decreased output per person when actually performing in groups. The dashed line along the top represents potential productivity--the output to be expected if there were no losses due to faulty coordination or to social loafing. The striped area at the bottom represents the obtained output per person in actual groups. It is obviously lower than potential productivity and

this decrease can be considered as representing the sum of losses due to incoordination and to reduced individual effort.

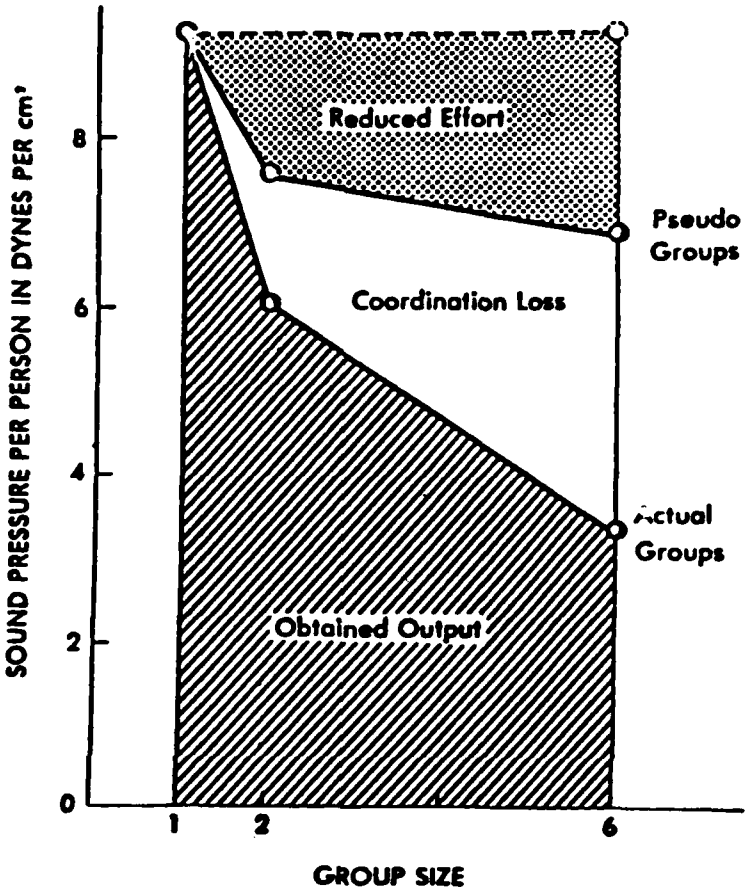

Figure 2. Intensity of sound produced per person when cheering in actual or perceived groups of 1, 2 and 6 as a result of reduced effort and faulty coordination of group efforts. Experiment 2.

In addition to shouting in actual groups, individuals also performed in pseudogroups in which they believed that one or five people were shouting with them, but were actually shouting alone, preventing any kind of sound cancellation or coordination loss from affecting output. As shown in Figure 2, people shouted with less intensity in pseudogroups than when alone, $F(2, 10) = 37.0$ $p<.0001$, accounting for 26% of the variance. Thus group size made a significant difference even in pseudogroups in which coordination loss is not a factor and only social loafing can operate.

When performers believed one other person was yelling, they shouted 82% as intensely as when alone and when they believed five others to be yelling, they shouted 74% as intensely. The stippled area defined on the top of Figure 2 by the data from the pseudogroups represents the amount of loss due to social loafing. By subtraction we can infer that the white area of Figure 2, which consists of that portion of the total reduction below potential productivity not accountable as due to reduced effort, can be considered as resulting from coordination loss. Since the latter comprises about the same amount of area as the former, we can conclude that, for shouting, half the performance loss decrement is due to incoordination and half is due to social loafing.

Discussion

Despite the methodological differences between Experiments 1 and 2, both experiments showed that there is a reduction in sound pressure produced per person when people make noise in groups compared to when alone. People in Experiment 1 applauded and cheered in full view of each other, with all the excitement, embarrassment and conformity that goes along with such a situation. In Experiment 2 no one could see or hear any other person. Only the experimenters could see the people perform. And finally, the rationale changed drastically from the experimenters' interest in "judgements of how much noise people make in social settings" to their interest in "the effects of sensory feedback on the production of sound in social groups." Yet, despite differences in the task characteristics and supposed purpose, both studies produced similar results. This points to the robust nature of both the phenomenon and the paradigm.

We believe this experiment demonstrates the existence of an important and interesting phenomenon. Social loafing may not be the only or major cause of the world's problems of productivity, but it certainly has the potential to contribute to them. In the remainder of this paper we will report more research designed to elucidate the causes and the consequences--and perhaps provide a start toward discovering the cure--for social loafing.

Noise Production as Group Performance

Although we don't usually think about it that way, making noise can be hard work, in both the physical and psychological senses. In the present case, participants were asked to produce sound pressure waves, either by rapidly vibrating their laryngeal membranes or by vigorously striking their hands together. Although superficially similar in consequence, this task should not be confused with more normal outbreaks of shouting and clapping that occur as spontaneous outbursts of exuberant expressiveness. Our participants shouted and clapped because we asked them to, not because they wanted to.

This effortful and fatiguing task resulted in sound pressure waves which, although invisible, can be easily and accurately measured in physical units that are proportional to the amount of work performed. The making of noise is a useful task for the study of group processes from the standpoint of both production and measurement--people are practiced and skilled at making noise and can do so without the help of expensive or cumbersome

apparatus, and acoustics and audio engineering are sufficiently advanced to permit sophisticated data collection.

We seem to have found a paradigm where people get involved enough to try hard and be somewhat enthusiastic, yet the task is still effortful enough so that they loaf when given the opportunity. We feel we can claim, in both senses of the word, that our research paradigm is sound. In the remainder of this paper you will hear more of it. We think you will find our results cheering and hope you will applaud our efforts.

Chapter Three
The Causes of Social Loafing

Why should people reduce their exertions when it comes to shouting and clapping with others? We suggest three lines of explanation, the first having to do with submaximal goal-setting, the second with attribution and equity, and the third with the lessening of the contingency between individual inputs and outcomes.

1. Subliminal goal setting. It may be that despite our instructions, participants redefined the task and adopted a goal, not of making as much noise as possible, but merely of making enough noise or of matching some more-or-less well defined standard. Individuals would clearly expect it to be easier to achieve this goal when others are helping, and might work less hard as a consequence. This, of course, would change the nature of noise production from what Steiner (1972) would term a "maximizing" to an "optimizing" task. A maximizing task makes success a function of how much or how rapidly something is accomplished. For an optimizing task, however, success is a function of how closely the individual or group approximates a predetermined "best" or correct outcome. If participants in our experiments perceived sound production as an optimizing rather than a maximizing task, they might feel the optimal level of sound output could be reached more easily in groups than alone, thereby allowing them to exert less effort.

Participants in Experiment 2 could hear neither themselves nor others and would not be able to determine whether their output was obnoxious or to develop a group standard for an optimal level. Furthermore, in both experiments, the experimenters reiterated their request to yell "as loud as you can, every time" over and over again. Before the first trial they would ask the group how loud they were supposed to yell. In unison, the group would reply "as loud as we can." We think it unlikely that participants perceived the task to be anything other than maximizing.

2. Attribution and equity. It may be that participants engaged in a faculty attribution process leading to an attempt to maintain an equitable division of labor. There are at least three aspects of the physics and psychophysics of producing sound that could have led people to believe that the other persons in their group were not working as hard or effectively as themselves. First, when persons perform alone their outputs are likely to seem louder than those of the others, simply because they are closer to the sound source. Second, even if everyone worked to capacity, sound cancellation would cause group outputs to seem much less than the sum of their individual performances. Finally, the perception of the amount of sound produced in a group should be much less than the actual amount--growing only as the .67 power of the actual amount of sound according to Stevens' psychophysical power law (1975).

These factors may have led individuals in Experiment 1 to believe that the other participants were less motivated or less skillful than themselves--in short, shirkers or incompetents. Thus, differences in the perception of sound production that were

essentially the result of physical and psychophysical processes may have been misattributed to either a lack of skill or motivation on the part of others, leading individuals to produce less sound in groups since there is no reason to work hard in aid of shirkers or those who are less competent.

This process cannot explain the results of Experiment 2 since the capacity to judge the loudness of one's own output, much less that of others, was severely impaired by the 90 dB background masking noise used to signal the trials. However, rather than "discovering" social loafing while participating in the experiment, participants may have arrived with the preconception that people often do not pull their own weight in groups.

Previous experience in groups (i.e. on committees) may lead individuals to believe that in situations in which the responsibility for performing a task is shared, others tend to shirk, attempting to get by with as little effort as possible. Consequently, lack of trust and the potential for attributing laziness or ineptitude to others could have led people to work less hard themselves. In a dialogue between Israeli kibbutzniks, one notes that: "When you work in a group there is a natural tendency to feel that you are giving your optimum--`I am really pulling a big load but those in front of me and behind me are doing a little less'--this feeling naturally creeps up on you unless you have faith in the group within which you are working" (Criden and Gelb, 1976, pp. 61-62). Participants in Experiments 1 and 2 may well have begun the task with less than full faith in their fellows, leading them to loaf.

Experiment 3:
Preconceptions about Group Effort

If people operate under the preconception that others will shirk when performing tasks such as ours in groups, this preconception should lead them to predict strong social loafing effects if such an experiment is described to them. To test this, 30 males and 30 females gathered in homogeneous sexed groups of from two to four and asked to predict the behavior of subjects in a psychological experiment. They read a verbatim set of instructions exactly similar to those used in Experiment 2 with the exceptions that for half, the sound production task was described as clapping rather than shouting, and for all, the number of subjects was described as four rather than six. Then, they read a concise but complete description of the procedure and were asked, "Given this experiment...Compared to his utmost capacity (as though his life depended on it) how loudly did the average subject clap (shout) when he clapped (shouted) alone?" They also made estimates for the amount of noise produced in pairs and in foursomes, all expressed as a percentage of total capacity. Finally, they were asked to continue their role-playing by completing a typical post-experimental questionnaire as they thought an average subject in a real experimental would.

Results

Contrary to the hypothesis that participants may come to the experiment with the preconception that others shirk in groups, the respondents estimated that average subjects would produce more sound when performing with others, 79% of capacity, than

when alone 63%, $p<.05$. They also expected subjects to report efforts in line with their actual output, 80% in groups, 69% alone, $p<.05$. Finally, they thought subjects would estimate that the others would also try harder in groups, 80%, than when alone, 69%, $p<.05$.

Respondents also estimated that subjects would exert more effort in clapping, 80%, than shouting, 74%, $p<.05$, and that subjects would report feeling more embarrassed when performing alone, 65%, than when performing with others, 43%, $p<.05$.

These data provide no support for the suggestion that participants come to the task with the idea that others will shirk. To the contrary, respondents indicated that they expected subjects to put out more effort when performing in groups than when alone. In addition, the respondents did not feel that subjects would suspect their coworkers of slacking.

An explanation for this pattern of results may lie in the fact that respondents felt that making noise alone would be more embarrassing than doing so with others, possibly leading them to inhibit their efforts when alone. To shout or clap alone is embarrassing enough, but to do so loudly would make it worse. This overemphasis on embarrassment (interviews with actual subjects suggest that overall embarrassment is quite low in this situation, and that subjects feel equally embarrassed alone and in groups) could mask a true belief in the inherent laziness of one's fellows. Therefore, we added a second condition in which respondents learned that subjects are not embarrassed under the experimental procedures.

Again, 30 males and 30 females were asked to predict subjects' behavior, but this time they were told that "After reading these instructions, many people think that the actual subjects would be quite embarrassed to take part in this task, particularly when producing the sounds alone. However, in interviews after taking part in the task, subjects have reported that, since they could not be seen or heard by each other or by people outside of the room, they had not felt at all embarrassed, and had felt just as unembarrassed alone as in groups."

Respondents apparently attended to the instructions; there were no differences in predicted embarrassment as a function of group size. Even so, respondents still did not expect to find subjects slacking off in groups. Estimates of output averaged around 80% and did not vary as a function of group size. Subjects were expected to estimate similar degrees of effort for themselves and the others, and these estimates also did not vary as a function of group size, averaging around 83%.

These studies provide no evidence for the hypothesis that participants come to the task with the preconception that their fellows will put out less than optimal effort. In fact, only when given the additional information that the task is unembarrassing did the respondents express the belief that other subjects would put out as little effort in groups as when alone. Thus, there is no support for the possibility that participants in Experiment 2 worked less hard in groups because they were trying to maintain equity in the face of the belief that their fellows were themselves slacking off. In addition, these data also suggest that the results of Experiments 1 and 2 cannot be

accounted for by the operation of simple demand characteristics.

3. Lessened contingency between input and outcome. It may be that participants felt that the contingency between their input and outcome was lessened when performing in groups. Individuals could "hide in the crowd" (Davis, 1969) and avoid the negative consequences of slacking off, or they may have felt "lost in the crowd" and unable to obtain their fair share of the positive consequences for working hard. Since individual scores are unidentifiable when groups perform together, people can receive neither precise credit nor appropriate blame for their performance. Only when performing alone can individual outputs be exactly evaluated and rewarded.

Let us assume that group members expect approval or other reward proportional to the total output of a group of N performers, but that since individual efforts are indistinguishable the reward is psychologically divided equally among the participants, each getting 1/N units of reward. Under this assumption, the average group, if it performed up to capacity and suffered no process loss, could expect to divide up N times the reward of the average individual, resulting in each member's getting N x 1/N, N/N units of reward, the same amount as an individual.

Although the total amount of reward may be the same, however, the contingency on individual output is not. Any given individual under these assumptions will get back only 1/Nth of his own contributions to the group; the rest will be shared by the others. Even though he may also receive unearned 1/Nth of each person's contribution, he will be tempted, to the extent that his own performance is costly or effortful, to become a "free rider" (Olson, 1965). Thus, under these assumptions, if his own performance cannot be individually monitored, an individual's incentive to perform should be proportional to 1/N.

Seligman (1975) has shown that animals and people become lethargic and depressed when confronted with a task in which they have little or no control over the outcomes. Likewise, in our experiments, people may have felt a loss of control over their fair share of the rewards when they performed in groups, leading them also to become, if not lethargic and depressed, at least less enthusiastic about making lots of noise.

Since people were asked to shout both alone and in groups, they may have felt it smart to save their strength in groups and to shout as lustily as possible when scores were individually identifiable, marshalling their energy for the occasions when they could earn reward. This line of reasoning suggest that if inputs were made identifiable and rewards contingent upon them, even when in groups, it would be impossible for performers to get a free ride and they would have an incentive to work equally hard in groups of different sizes.

As we shall see, further research seems to bear out this line of thought.

Chapter Four
The Transcultural Generality of Social Loafing

Although participants in Experiments 1 and 2 shouted and clapped, the results of their efforts were not very cheering. The present research proves that performance losses in groups occur with tasks other than rope pulling and with people other than prewar German workers. There are, in addition, other instances of experimental research that demonstrate similar cases of social loafing. For example, Marriott (1949) and Campbell (1952) have shown that factory workers produce less per person in larger groups than smaller ones. Latane and Darley (1970) have found that the likelihood that a bystander will intervene in a situtation in which someone requires assistance is substantially reduced by the addition of other bystanders who share in the responsibility for help. Wicker (1969) has found that the proportion of members taking part in church activities is lower in large than in small churches, presumably because the responsibility for taking part is less diffuse. Similarly, Petty, Harkins, Williams, and Latane (1977) found that people perceived themselves as exerting less cognitive effort on evaluating poems and editorials when they were among groups of other unidentifiable evaluators than if they alone were responsible for the task.

Experimental findings have demonstrated, then, that a clear potential exists in human nature for social loafing. We suspect that the effects of social loafing have far-reaching and profound consequences in both our culture and others.

Social Loafing on the Kolkhoz

On the Russian collective farm (kolkhoz), the peasants "move all over huge areas, working one field and one task one day, another field the next, having no sense of responsibility and no direct dependence on the results of their labor" (Smith, 1976, p. 281). Each peasant family is also allowed a private plot of up to an acre in size, that may be worked after the responsibility to the collective is discharged. The produce of these plots, for which the peasants are individually responsible, may be used as they see fit. Although these plots occupy less than 1% of the nation's agricultural lands (about 26 million acres), they produce 27% of the total value of Soviet farm output (about $32.5 billion worth) (Yemelyanov, 1975: cited in Smith, 1976, p. 266). In 1973, in terms of value, these private entrepreneurs accounted for 62% of the nation's potatoes, 32% of other fruits and vegetables, 47% of the eggs and 34% of the meat and milk (Smith, 1976).

These statistics may be somewhat misleading since the kolkhozniks can get higher prices for their goods than does the state. However, productivity is also higher on these private plots (Wadekin, 1973, pp. 64-66). For example, the private sector is more than twice as productive as the public sector in pork output. The same advantage for the private sector was also noted for beef, mutton, milk, eggs, and wool. The same is true of crop production. The yields perhectare of private plots for potatoes, vegetables, berries, fruit, grapes, and corn are from one-third to two-thirds higher than in the public sector.

Finally, according to Wadekin (1973, p. 64) the produce of the private sector is of better quality than that of the public sector.

Although there are many reasons that may account for the productivity and quality differentials, one major contributor is the greater labor inputs and closer personal concern afforded the private plots. As cited by Wadekin, I. Vinogradorov puts it this way: "Here on his plot the kolkhoznik's calculation has a firm, reliable basis, there everything depends on him alone, here he can `plan,' measure the results of his labor...Who can be surprised that the peasant works quite differently on the kolkhoz from his plot" (Wadekin, 1973, p. 66). It is not, however, that the private sector is so highly efficient; rather, it is that the efficiency of the public sector is so low (Wadekin, 1973, p.67).

This is of course an embarrassment to the Soviet authorities and several unsuccessful attempts have been made to reduce or eliminate these private holdings. Also, attempts have been made to increase productivity on the kolkhoz. One means of motivating the workers to produce more on the collectives has been to increase payments and at the same time to reduce in kind payments (i.e. giving back the kilkhoz some of its own produce). Despite these shifts in payment structure greater participation in the socialized sector has not occurred. For example, although from 1953 to 1963 the growth in peasant incomes was significant, the percentage of time spent in kilkhoz work remained relatively constant (Stuart, 1972).

It has also been suggested that an attempt should be made to "revive the peasantry's attachment to the land, by trying to use the principle of private plot incentives on collective farmland" (Smith, 1976, p. 281). Collective land would be turned over to farm "links" (small working groups of five to ten persons) who would be responsible for the output. A September 7, 1965 article in the London Times quotes an article in the Komsomolskaya Pravda in which it was argued that:

> It was "impossible to close one's eyes" to the fact that the lack of any personal responsibility for the land or equipment stemming from an absence of any concept of direct "juridical" ownership, was leading the countryside to ruin. The peasant needed to feel responsible for the land "daily and hourly throughout the year." But at present there was no definite "master" to the soil and all too often communal property is regarded as "nobody's."

This was not a plea for private ownership, but rather for small collectives in which responsibility is focused. The individual, thus, could see the benefit of producing on the collective as well as on the private plots. An experiment using this link method showed that a tenman link could triple the yield of a tract normally worked by 80 people (Smith, 1976). These experiments, however, have not led to any appreciable changes in Soviet agriculture, perhaps because they smack of capitalism, and also since they run counter to the notion of economy of scale (bigger is better) so popular in Soviet economic theorizing.

The Kolkhoz vs. the Kibbutz

Before we decide that social loafing has achieved pandemic proportions we should consider the case of the Israeli kibbutz, a case that shows how social loafing may be altered or modified. The Israeli kibbutz was established a means of returning to the soil Zionist immigrants unaccustomed to farming. The goals of the kibbutz were: 1) to settle inhospitable land using the joint effort of a group united by common aims; 2) facilitate the transition to agricultural labor of young people unaccustomed to its rigor; 3) allow the absorption of successive waves of settlers; 4) follow socialist principles and to utilized only self-labor with no wages; 5) to employ democratic self-government with equality for all (Leon, 1969).

The kibbutz exists within an economic system that allows private ownership. In addition, the location of kibbutizim is motivated not by the promise of high agricultural yield but by national need. Many are located in remote and undeveloped areas on the periphery of Israel and in order to protect the borders and to develop these regions. In spite of these unfavorable conditions, between 1949 and 1959, while the number of workers in kibbutzim increased by 31% their production increased 3.6 times. In other countries "whereas forty to eighty years are normally required to raise agricultural output 2 to 3 times, the kibbutz succeeded in raising output per worker roughly four times in twenty years" (Leon, 1969, p.46). Kanovsky (1966) cited by Leon (1969) notes that from 1953 to 1958 kibbutz labor productivity increased at an average of 12.2% per year as against 7.3% in Israel's agriculture as a whole.

In dairying, 1963 yields per cow on the kibbutz were 27% higher than for the rest of Israel's herds, and in 1960 were 75% higher than in England. In 1959 kibbutz chickens were producing 21.7% of the eggs with only 16% of the chickens (Leon, 1969), presumably because of the greater care lavished on them by their human attendents. On the kibbutz no wages are paid. Each member is provided all his/her needs by the kibbutz. The Marxist dictum "From each according to his ability, to each according to his needs" appears to characterize the endeavor. Yet this system seems very productive and thrives.

What accounts for the success of the kibbutz and the severe problems of the kolkhoz? One explanation stems from the fact that on the kolkhoz the worker spends the time he must on the collective, but it is the private plot that provides the greates return for his effort, whereas within the kibbutz there are no private holdings. This suggests that social loafing both on the kolkhoz and in the laboratory, may result from the use of an allocational strategy, whereby, given the choice between working for the group or for one's self, people save their energy for the latter alternative.

In terms of our laboratory paradigm, social loafing could be motivated by one of at least two strategies, the implications of which are quite different:

1) The allocational strategy: Participants are told that their task is to produce as much noise as possible and may be perfectly willing to do so. However, they know that their individual output can be identified only when they perform alone.

When producing sound with others, only the total output can be measured and individual credit or blame cannot be awarded. Participants may realize they have only a finite amount of resources to put into the task. Given the choice between working hard when shouting with others or concentrating their efforts on shouting alone, they may decide to allocate more energy to the alone trials where their efforts can be identified and rewarded. Overall, each participant may make as much noise as possible, but each may allocate more effort to the individual trials, leading to social loafing.

2) The minimizing strategy: Making loud sounds is tiring work and participants may wish to minimize their overall energy expenditure. When performing alone, their output can be measured and so they work hard. However, when performing with others, their outputs are unidentifiable, they are "lost in the crowd," their incentive to work hard is reduced, and so they minimize their efforts. In this case, social loafing is a consequence of an unwillingness to work hard resulting from the opportunity to avoid blame or the lack of opportunity to gain credit, rather than from a desire to maximize the return from one's efforts.

If social loafing results from a human tendency to follow an allocational strategy, we may be relatively optimistic about the possibilities of effective collective effort, with people willing to devote their full energy to group activities as long as there are no individual activities for which to conserve strength. However, if social loafing results from a minimizing strategy, we may fear that submaximal output will be a general problem wherever collective action is called for. Support for the optimistic possibility comes from the comparison of the kibbutz and the kolkhoz discussed above.

Experiment 4:
Allocating Effort or Taking it Easy*

In the present experiment, participants were asked to work alone and in groups under two types of experimental design. In the Within-S design, as in previous research and on the Russian kilkhoz, each participant worked both alone and with others and thus may have been guided by either the allocational or the minimizing strategy. In the Between-S design, on the other hand, participants either worked alone or worked together and thus did not have the opportunity to allocate exertions between the two conditions. If social loafing results from an allocational strategy, we would expect that when individuals perform in groups all of the time, as in the Israeli kibbutz, all of their effort should go to the group performance since there are no individual opportunities for which to save their energy. Thus, no differences would be predicted between the output of individuals performing alone and those performing in groups all of the time. On the other hand, if social loafing results from a minimizing strategy, it should make no difference which experimental design is employed. Even if persons perform in groups all of the time

*Experiment 4 is reported in further detail in Harkins, Latane, and Williams (1980).

and thus have no reason to conserve their strength for other activities, their relative lack of identifiability does not allow for the assignment of credit or blame and they should still indulge in social loafing.

Method.

The 48 males and 48 females took part in homogeneous sexed groups of four to fulfill a course requirement for Introductory Psychology. Upon arrival, each was assigned a letter (A, B, C or D), seated in a semicircle with the chairs 2.16 meters apart, and asked to don earplugs, blindfolds and headsets. They were told that we were interested in the effect of the reduction of sensory feedback on the production of sound in social groups, tht they owuld produce the sound by clapping, that the blindfolds and headsets were to reduce sensory feedback, and that they would not be able to see or hear each other as they clapped. Moreover, they were told that C would always clap alone, that D would always clap with someone else, and that A and B would sometimes clap alone and sometimes with another. In each case, they were asked to clap as loudly as they could.

After hearing these instructions, participants went through a series of 24 trials in which each person clapped six times. A and B each clapped alone three times and thought they clapped with D three times; C clapped alone six times; and D thought she/he clapped with A and B three times each. Therefore, A and B were replicating past research where individuals clapped alone and in groups. Person C performed alone only, and D performed in groups only.

In actuality, of course, individuals always clapped alone so that we could determine how much effort each exerted. On the "pseudopair trials" when they were told they were to clap with someone else, everyone else had their headphones switched to the second track of the stereophonic instruction tape and heard, "No one clap." Each trial was accompanied by a 90 dB prerecorded masking noise of people clapping, introduced as a technique for reducing sensory feedback as well as a signal to begin clapping.

Results

As in Experiment 2, persons who performed both alone and together made less noise when clapping with a partner (.97 dynes/cm2, than when they thought they were clapping alone (1.29 dynes/cm2, $F(1, 46) = 82.8$, $p<.001$). When performing in "groups" these participants produced only 75% as much noise as when performing alone. It is this reduced output that we have termed "social loafing."

The purpose of the present experiment was to determine whether people who clapped in groups exclusively, and thus have no individual trials for which to husband their strength, also exhibit social loafing. The answer is clear--they do. Persons who always performed in pairs produced less sound (.85 dynes/cm2PT) than those who participated exclusively alone (1.35 dynes/cm2, $F(1, 44) = 13.8$, $p<.01$). Persons who always thought they were performing in groups produced only 62% of the noise created by persons who always performed alone.

Planned comparisons revealed no significant differences in either the alone or the group performances of participants who clapped under both conditions as compared to participants who clapped only under one, ps<.20. Not only does social loafing occur when participants do not have individual trials for which to husband their strength, it occurs to about the same extent in the two situations.

Replication. Because of the combined Within-S, Between-S design, everybody was aware that some participants were to clap both alone and together while others took one role exclusively. Perhaps knowing that others were switching back and forth from single to group performances made salient the possibility of minimizing effort. Knowing that one person was to clap alone all of the time could have made more obvious this opportunity for loafing. To exclude these possibilities we replicated this study in a completely Between-S design.

The 24 male and 24 female volunteers were drawn from the same pool of volunteers, were run concurrently with, and received the same instructions as participants in the main experiment except that one half of the groups were told that each of them would always clap alone, while the other half of the groups were told that they would always clap in pairs. As in the main experiment individuals in the pair performance groups believed they were clapping with one other person while they actually clapped alone.

Replicating the main experiment, individuals who thought they were clapping with another person produced less noise, .89 dynes/cm, only 57% of the 1.56 dynes/cm produced by those who clapped alone, $F(1, 44) = 27.6$, $p<.0001$. We can conclude that the effect does not depend on knowing that other people performed under conditions different from one's own.

Discussion

Unlike Experiment 2 in which participants exhibited social loafing while shouting, the present study asked participants to make noise by clapping their hands. While both shouting and clapping require effort, clapping requires more gross muscular exertion than does shouting. Also, clapping even for short periods is likely to be more painful than shouting. This may account for the fact that clapping led to much more social loafing than shouting. When clapping in the present studies, participants performing in pseudopairs reduced their exertion to an average of 65% of their alone rate. When shouting in pseudopairs on the other hand, participants in Experiment 2 reduced their output only to 82% of their alone rate. Perhaps because it is harder to generate noise by clapping, the extent of social loafing is greater than with shouting.

In this study, unlike previous ones, females as well as males served as participants. One might speculate that females are less likely to loaf than males since they are "generally more concerned with social relational aspects of group situations" (Eagly, 1978, p. 103). On the other hand, since the task requires strenuous physical effort and thus may be considered masculine, females may be less motivated and more willing to loaf. Neither of these alternatives received support. Social

loafing occurred with females to the same extent as with males.

Males did produce 29% more sound than females but this was the case for both alone and "group" trials and probably results from differences in strength, since self-report data reveal no differences between the sexes in their perceptions of how much effort was exerted.

Overall, our results were inconsistent with the hypothesis that social loafing in this situation results from adopting an allocational strategy. Even though there was no reason to conserve energy for individual trials, people who always performed in groups exerted much less effort than those who always performed alone and the extent of their social loafing was the same as for those who clapped both alone and together. The results are easily explained by a minimizing strategy, where participants are motivated to work only as hard as necessary to gain credit for a good performance or to avoid blame for a bad one. Whenever the experimenter was unable to monitor individual outputs directly, performers sloughed off.

Are people aware of the strategies they appear to adopt? In our previous research using a Within-S design, when asked to estimate what portion of their utmost capacity they had expended, participants indicated that they had expended as much effort in groups as when alone, and they believed the other participants had done so also. In the present study, replicating this effect, individuals who participated in the Within-S portion of the design also reported expending as much effort when performing together (60% of capacity) as when performing alone (61%). However, in both the main experiment and the replication, individuals who always performed alone reported putting out more effort (79% and 75% respectively) than people who always performed together (59% and 60% respectively, $ps<.05$). For people who clapped both alone and together, acknowledgement of their increased output when alone would entail an admission of the fact that they had loafed. In the Between-S portions of the design, which did not require the admission of loafing, the difference emerged. It is puzzling, however, that the difference results from an increase in the acknowledged effort in the alone conditions rather than a decrease in the together condition.

In Hungary as in Russia, state farm workers are allowed to grow produce work on private plots which they can use for their own purpose--to consume or to sell privately. Like Russia, although the private plots account for only 13% of the farmland, they "produce a third of the country's fruits and vegetables and half of its beef cattle" (J. Spivak, Wall Street Journal, June 6, 1979). In industry, as well, private sectors account for much of the economic growth in Hungary. Because of this, "some experts believe that the second economy is largely responsible for the low productivity in state enterprises" (Spivak, 1979). An outgrowth of such a belief could be a decision to cut back on private enterprise in hopes of increasing productivity for the state. The results of the present studies suggest this course of action may prove ineffective, resulting in continued low productivity in the state jobs, while wiping out the economic growth of the private sector.

When farm workers have the opportunity to allocate their efforts between collective and individual effort, as on Russian and Hungarian collectives, greater effort is put into the private plots. When there are no private plots, as on the Israeli kibbutz, workers are very productive in their collective endeavor. However, the present research offers no support for the hypothesis that social loafing results from or is even much affected by conditions which should encourage an allocational strategy. What then might account for the greater productivity of the kibbutz as compared to the kolkhoz?

Their historical antecendents differ greatly. The Russian peasant even before collectivization lived under a form of collective since each village was responsible for paying taxes to the government, even though there were individually held plots of land (Jasny, 1949). During collectivization (1928-1937) the farmers were forced to merge their holdings. Millions of lives were lost in this period during which the percentage of peasant holdings in collectives rose from 1.3% to 93%. In contrast to this, the kibbutz was from its inception a voluntary association, and its land was provided by the state.

More important, we think, are the effects of identifiability and group pressure. Prospective kibbutzniks must go through a trial period and must then be voted in by the others. Hard work on the collective is greatly valued. Prestige accrues to the hard worker, and the group is small enough so that the work of everyone can be monitored. Unlike the kolkhoz, on the kibbutz workers identify with their assigned branch of work and are greatly concerned with its productivity. "Ability to work and attitude toward work still constitute the most important single factor in our judgement of the individual" (Griden and Gelb, 1976, p.61).

Among the many differences between the kibbutz and the kolkhoz the one that strikes us is this sense of group identity and shared goals that imbues the description of the kibbutz. Dependence on the group and mutual supervision mean that rather than serving as a means of diffusing responsibility, on the kibbutz the group seems to intensify it. Certainly these two forms of the collective, the kibbutz and the kolkhoz, represent the range of possibilities for collective effort, and the experience of the kibbutz provides us with reason to believe that with further search we may be able to discover conditions under which laboratory gorups also could be led to produce as much or more noise collectively as individually. We believe that would be something to cheer about.

Chapter Five
Identifiability as a Deterrent to Social Loafing: Two Cheering Experiments

In Western Civilization it is commonly believed that being identified as the source of one's accomplishments and errors has an important effect on performance. Painters would be less motivated to create masterpieces if they could not sign their work in order to gain their deserved recognition. Actors are often as concerned about their billings as their roles. Athletes perform with one eye on their teams' standing and another on their individual statistics. Even in the People's Republic of China, where collective accomplishments enjoy ideological primacy, assembly line workers are asked to sign their work, presumably to improve the quantity and quality of the product. As a final example, we suspect that researchers might be less motivated to run experiments and write them up if they were not able to display their names somewhere on the published work.

In short, people seem to be more likely to do a task well if their work is identifiable to other people, especially if the other people are in some way important sources of reinforcement. Conversely, when people's outputs are unidentifiable, they seem to feel less motivated to perform well; either because they are unable to reap their proper rewards or because they can "get away" with taking it easy without incurring criticism or blame.

We feel that this process of reduced effort due to unidentifiability will help explain the phenomenon of social loafing. Common to each of the demonstrations of social loafing is that there was but a single instrument for measuring group productivity. In the case of rope pulling, one strain gauge measured the total amount of pressure exerted, and in sound production tasks, one sound-level meter measured the total amount of noise. Thus, for both types of task there was only one reading for an alone performance, and likewise, only one reading for a group performance. In Davis' (1969) terminology, these tasks are "information-reducing" in contrast to "information-conserving" tasks which preserve individual performance.

Because of this feature, individual efforts were identifiable only when participants worked alone. When in groups, individual outputs were lost in the crowd, submerged in the total, separately unrecoverable by the experimenters. This lack of identifiability in groups may have led people to feel less motivation to do well, less need to work hard. Thus, decreases in individual performance when working in groups compared to working alone may result from the fact that individual performances are less identifiable when working in groups then when alone.

The present set of experiments attempts to demonstrate that identifiability is a crucial factor in accounting for the decrement in individual performance in groups. If this is the

*Experiment 5 is reported more fully in Williams, Harkins & Latane (in press).

case, making individual outputs identifiable even when performing in groups should eliminate the decrement. Experiment 5 was designed to test this prediction.

Experiment 5: Increasing Identifiability In Groups Leads to Increased Performance*

Groups of six college males were asked to shout as loudly as they could for a series of five-second trials, sometimes shouting alone, and at other times shouting in pairs or sixes. They were unable to see or hear themselves, the other members of their group, and the experimenters. In State 1, participants believed their outputs would be identifiable to the experimenters when they shouted alone, but not when they shouted in groups since only the group total was accessible. In State 2 each person was given a microphone and told their individual outputs would be identifiable to the experimenters even when they shouted in groups. In fact, we were able to measure individual outputs alone and in pesudogroups throughout both stages.

Method

Eight groups of six male undergraduate volunteers, a group at a time, heard the same instructions and followed the same procedure as participants in Experiment 2 for Stage 1 which consisted of 25 trials, after which, they, were invited to remove their blindfolds and headsets and to take a breather. For State 2, participants were told: "Up to this point we haven't monitored your individual outputs when you have shouted in groups but have looked only at the group total. So when you yelled in groups of two or six we could not tell how loudly each of you yelled. Now, however, we are going to put individual microphones on each of you. In this way we will be able to tell exactly how loudly you are yelling alone or in groups of two and six and can determine each person's contribution to the group output. Remember that this is not a competition and you will not know your scores until afterwards but we want you to shout as loudly as you can."

Everyone was given an individual lavaliere microphone to hang around his neck. One experimenter went into the adjoining control room where, visible through the one-way window, he spent about five minutes carefully calibrating for each person in turn a bank of compressor amplifiers. Each participant was asked to shout at exactly 75 dB while, with a great many hand signals and other messages, the experimenters adjusted the compressor amplifiers appropriately. After the completion of calibration participants were cautioned about moving their microphones and they donned their headsets and blindfolds once again in preparation for the second of 25 trials.

Although it is possible that with the appropriate microphones and associated circuitry we might have actually been able to monitor individual performance levels, out equipment did not in fact allow us to do this. This failing is not serious, however, since the logic of the experiment demands only that participants believe that they were being individually monitored. Data were analyzed by two 2 (Stage) X 3 (Group Size) analyses of

variance. The unit of analysis was the group and each score was based on the average output per person.

Results

We believe participants took the task seriously and devoted a good deal of effort to doing well on it. When shouting alone, they averaged 9.50 dynes/cm2 (94 dB). This sound level is very close to that achieved by participants in Experiment 2 and, from a distance of four feet, is comparable to the noise in a subway station when a train comes through.

Stage I. Although people were able to produce more total sound pressure when they shouted in groups, groups did not produce as much sound as would be expected by merely summing the alone performances, with pairs producing only 1.2 times and sixes 1.8 times as much noise as individuals (Figure 3). However, again we must examine individual performances in pseudogroups in order to determine how much of the reduction in group output is due to social loafing.

People made 69% as much noise when they shouted in pseudopairs and 63% when they shouted in pseudosixes as when alone, $F(1,7) = 55.8$, $p < .0001$. This difference between individuals shouting alone and when they believed they were shouting in groups indicate that people do exert less effort in groups then when performing alone, and represents what we have called social loafing.

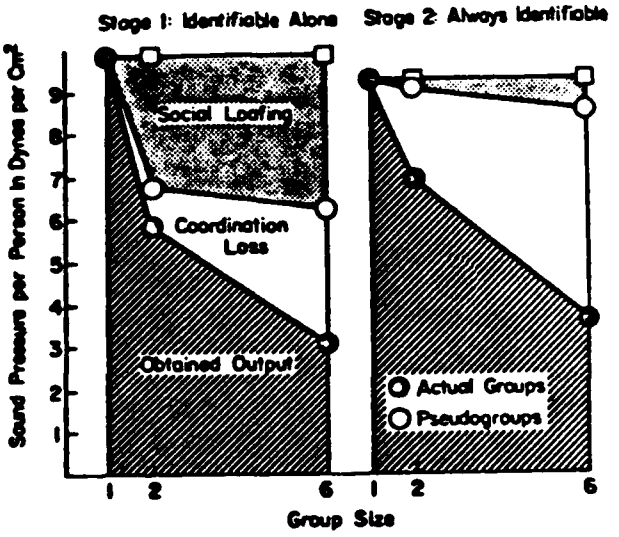

Figure 3. Sound pressure as a function of group and identifiability, Experiment 5.

Stage II. People responded conscientiously to the calibration task. They worked hard to maintain a 75 dB tone so the experimenters could adjust their equipment and gave no indication of suspicion; in fact, participants seemed quite impressed with our technical facilities.

The addition of microphones did not affect the amount of effort exerted when people performed alone. Participants produced 9.86 dynes/cm2 in Stage 1 and 9.22 dynes/cm2 in Stage 2 (n.s.). We can conclude that people felt equally identifiable when shouting alone, with or without the microphones and made a lot of noise.

Wearing microphones did affect performance in pseudogroups. When shouting in pseudopairs, individuals produced 98% (9.06 dynes/cm2) of their alone efforts and in pseudosixes 92% (8.48 dynes/cm2). Neither of these levels differ significantly from the alone rate, but they do differ from the comparable pseudogroup performances in Stage 1, $F(1,7) = 37.8$, $p<.0005$. It is apparent that the addition of microphones virtually eliminated social loafing in groups.

Questionnaire Data. At the end of the experiment, participants were asked to estimate, in terms of the percentage of how loudly they could shout if their life literally depended on it, how loud they had been when shouting alone, in pairs and with five other people. Participants reported that they shouted louder with microphones than without, 79% versus 76%, $F(1,40) = 13.9$, $p<.01$, and that thie held true even when performing alone, a claim not supported by actual performances. Further support for the suggestion that peoples' perceptions of their behavior and their actual behavior do not always agree comes from the fact that participants incorrectly report that group size had no effect on their behavior. As shown in Table 1, they respond that without microphones they always shouted at 76% of their capacities. Asked directly to compare how loud they and others were alone and in groups, participants again saw no differences due to group size.

Table 1: Estimated Shouting Intensity.

Condition	Unidentifiable (without microphones)	Identifiable (with microphones)
Alone	76%	81%
Pairs	76%	78%
Sixes	76%	78%

Thus, in response to two different sets of questions, participants were unable or unwilling to acknowledge the fact that group size influenced their efforts or the efforts of the other participants. If participants simply did not want to admit that they were not shouting as loudly as possible throughout the experiment, they should not have confessed to shouting less than 80% of their capacity. Therefore, the data seem to indicate that people are unaware of the influence the group has on either their own or others' outputs, and that whatever the reason they did not

shout as loudly in groups, it was not due to a conscious decision.

Discussion

It appears that making individual outputs identifiable when people perform in groups discourages social loafing. When people wear microphones they perform about as well in groups as they do when performing alone. This suggests that without individual microphones people felt identifiable only when they were alone and not when they were in groups. Since their alone performances were identifiable, they either wanted to or felt they had to exert as much effort as possible to comply with the experimenter's request. In contrast, group performances allowed people to slacken their efforts since their outputs could not be assessed by anyone.

Experiment 5 supports the inference that identifiability deters people from loafing since making peoples' outputs always identifiable even when in groups leads them to perform at a consistently high level across all group sizes. If identifiability is the mediator, then convincing people that their outputs are never identifiable, even when they perform alone, should cause them to perform at a consistently low level across all group sizes. Experiment 6 will test this hypothesis.

Experiment 6: Decreasing Identifiability Alone Leads to Decreased Performance*

Experiment 6 employed a between-subjects design in which some participants were always identifiable, some were never identifiable and some were identifiable only when shouting alone. We predicted that when "always identifiable," people would shout at a high level, comparable to when alone, irrespective of group size. Those who are "never identifiable" should perform at a low level of effort, comparable to that obtained in group conditions, at all levels of group size. Finally, group size effects should be obtained only for those people who are "identifiable only when alone" for whom identifiability is dependent on group size.

In Experiment 5, since the same people performed in both State 2 as in State 1, it is possible that they were more used to the task, more tired of shouting, less embarrassed, or their throats may have been hurting more. We think it is unlikely that practice or fatigue had any simple effects on the overall level of noise production since: 1) people tried no harder in the alone condition in Stage 2 than in Stage 1; and 2) our previous experiments have shown no signs of such effects over three replications of the basic 25 trial sequences. It is possible, though we think implausible, that the group size effects depended on the fact that participants experienced both conditions of identifiability. Since the experimenters knew from Stage 1 how loudly people could shout, participants may have felt obligated to maintain that level in Stage 2. In Experiment 6, identifiability is a between-, rather than a within-S factor, eliminating the possibility of such interpretations.

*Experiment 6 is also reported in Williams, Warkins & Latane' (in press)

Method

One hundred eight undergraduate males were tested in groups of four. The groups were randomly assigned to one of three instructional sets with nine groups of four people in each. As in the previous study participants were told that we were interested in the effects of the reduction of sensory feedback on the production of sound in social groups and shown the sound measuring system, which now consisted of a microphone (or individual lavaliere microphones in the "Always Identifiable" condition), and a "24 channel FM tape recorder interfaced with a Data General Nova 1200 Laboratory Computer."

In the "Identifiable Only When Alone" condition, intended to replicate the basic social loafing effect, participants were told: "Your outputs or the outputs of your group will be recorded so that when we are through with the experiment they can be analyzed by the computer to determine how much noise you make when shouting alone and how much noise your group makes. This means that we will not be able to tell how much noise each of you makes individually when you are shouting in groups, but only the total amount produced by the group. However, we will, of course, be able to tell how much noise you make alone. We are interested in how much noise you or your group can make, and we would like you to make as much noise as you can."

In the "Always Identifiable" condition, intended to replicate Stage 2 of Experiment 5, participants were told: "Your output when you shout alone and when others shout at the same time will be recorded so that when we are through with the experiment it can be analyzed by the computer to determine how much noise you make when you shout alone and when you shout in groups. This means we will be able to tell how much noise each of you makes individually even when you are shouting in groups. We will also, of course, be able to tell how much noise you make alone. We are interested in how much noise you can make when you are alone and when others are shouting with you, and we would like you to make as much noise as you can."

Finally, in the "Never Identifiable" condition, participants were informed: "All of your outputs when you shout alone or in groups will be recorded so that when we are through with the experiment they can be analyzed by the computer to determine the total amount of noise produced when the four of you shout alone or in groups. This means that we will not be able to tell how much noise you make individually, even when you shout alone. We will also, of course, not be able to tell how much noise each of you make in groups. We are interested in the total amount of noise produced by the four of you when you shout alone or in groups and we would like you to make as much noise as you can."

All participants then went through two blocks of 24 trials within each of which everyone shouted twice alone, twice in actual pairs, and twice in actual foursomes, and once each in pseudopairs and pseudofoursomes. The single and pseudogroup shouts were transformed into dynes/cm2, averaged within group size, and analyzed in a 3 X 3 X 2 ANOVA with identifiability instructions as a between group factor, and group size (1,2,4) and trial block as within group factors.

Results

As in previous research in this series, in the "Identifiable When Alone" condition, people exerted less effort in groups than when alone, $F(1,48) = 16.4$, $p < .01$, although the amount of loafing was not as great as in Experiment 5. In pseudopairs, people produced 81% (7.29 dynes/cm2) of their alone performance (8.97 dynes/cm2) and in pseudofours only 74% (6.67 dynes/cm2) compared to 69% for pseudopairs and 63% for pseudofours in Experiment 1.

Replicating Stage 2 in Experiment 5 in the "Always Identifiable" condition, people produced virtually the same amount of sound pressure alone as when they were in groups and this level of sound pressure was as high as in the alone condition of the "Identifiable When Alone" condition. People produced 8.81 dynes/cm2 alone, and 8.79 and 8.75 in pseudopairs and pseudofours (99% of their alone performance), resulting in no significant difference due to group size, $p<.50$.

In the "Never Identifiable" condition, group size again had no effect on peoples' performances. Shouting at the same level as in the pseudogroup trials of the "Identifiable Only When Alone" condition, people produced 7.52 dynes/cm2 alone, 7.51 in pseudopairs and 7.27 in pseudofours, $p<.50$. This was significantly less noise than they produced in the "Always Identifiable" condition, $F(1,48) = 17.5$, $p < .01$.

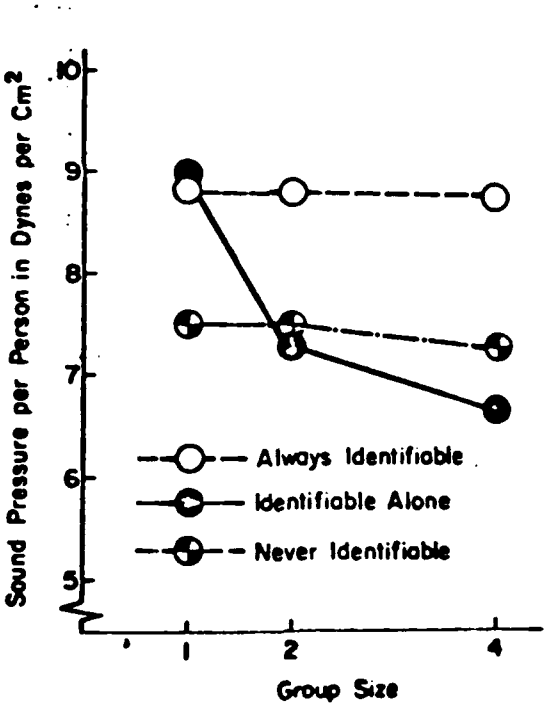

Figure 4. Sound pressure as a function of size of pseudogroup and identifiability, Experiment 6.

These results, presented in Figure 4, are in the expected pattern. The overall analysis supports this pattern with a significant instruction X group size interaction, $F(4,48) = 5.25$, $p<.01$. There were no effects or interactions for trial block, indicating that practice, fatigue or boredom did not affect overall performance or the tendency toward social loafing.

Questionnaire Data. Participants estimated that both they and the other pariticpants shouted at 82% of capacity and neither set of judgments was affected by group size. Participants did report feeling more responsible to the experimenter when shouting alone than in groups, $F(2,210) = 9.70$, $p<.01$. It appears that people are willing to admit that group size has some effect on them, but not that lessened responsibility justifies lessened effort.

Discussion

Each experiment has replicated past research on social loafing showing that people work less hard in groups compared to when they work alone. Both Experiments 5 and 6 show that making peoples' outputs identifiable even when they perform in groups eliminates social loafing. Experiment 6 also demonstrated that making their outputs unidentifiable even when they perform alone causes them to loaf without the presence of others. The results of both experiments suggest that identifiability of individual efforts is indeed a critical factor in social loafing. But why?

Identifiability could be important because it enables one's performance to be evaluated by other people. When performing, participants may have felt themselves subject to evaluation by the experimenter. They may have experienced "evaluation apprehension" an "anxiety-toned concern (Rosenberg, 1969)" that would motivate them to please the experimenters' explicitly stated desire to always shout as loudly as they could. Evaluation apprehension may have been especially high when performing alone or while wearing individual microphones and performances would be highly identifiable. Evaluation apprehension may have been lower when performing in groups or when individual scores were to be summed and performances would be unidentifiable.

Cottrell's (1972) version of social facilitation theory posits that an evaluative other increases a person's arousal level which, in turn, increases the likelihood or strength of a dominant response. It is interesting that this theory generally leads to the prediction that the presence of coactors will lead people to perform harder on well-learned tasks. In the present set of experiments the same explanation would seem to predict the opposite effect. That is, the presence of coactors should reduce a performer's level of identifiability and hence his level of evaluation and apprehension, leading him to experience less arousal and to work less hard than when working alone. This line of thought will necessitate a revision of the standard social facilitation position: There are cases where one should predict that people will perform worse on a well-learned task in groups than when working alone.

More generally, we believe that identifiability is important because it assures the contingency between effort and outcome.

When individual performances are unidentifiable, there can be no causal relation between response and outcome. Whether earning credit for a good performance or avoiding blame for a poor one, identifiability assures the person that this contingency can be operative. Although it is unclear what outcomes people expected to earn in the present studies, it is clear that they were motivated by them.

Seligman's (1975) theory of learned helplessness has drawn attention to the issue of effort-outcome contingencies. He claims that people and animals exposed to situations where there is no relationship between their responses and their outcomes, whether positive or negative, learn to experience a feeling of helplessness. Helplessness can lead to anything from a loss of motivation to severe depression and death. It seems unlikely that the decreased contingencies between effort and outcome involved when people engage in collective action would have such catastrophic consequences, but they could lead people to slacken their efforts.

In the present studies, identifiability consisted of the participant's knowledge that his outputs could be linked to him by the experimenter. The concept, however, is obviously similar to other states, such as anonymity, deindividuation, and diffusion of responsibility, all of which should be enhanced by performing in groups.

Identifiable to whom? Participants in Experiment 5 were led to believe that after the session was over each person would be able to see his own and everyone else's scores. Being able to examine one's own scores as well as comparing them with those of the other group members may have heightened the competitive nature of the task and motivated people to perform well on those trials in which their scores were recoverable. However, in Experiment 6, participants were told that they would not get to see their scores even after the experiment was over and that only the experimenters would see how loudly they shouted. Clearly social comparison and competitiveness are not necessary components of identifiability.

The experimenters in the Experiment 5 stayed in the room with the participants and could directly observe their performance and evaluate it subjectively. In Experiment 6, they were in different rooms and could only determine their objective dB meter reading. Whether identifiability involves subjective vs. objective evaluation of output does not seem to be critical to the elimination of social loafing.

It appears that all that is necessary in order to keep people from loafing is for someone to be able to monitor their performance. It is probably true that the evaluater(s) must be regarded as important by the performer for them to deter loafing effectively.

Are there degrees of identifiability? It may be that identifiability either exists or does not exist for a given individual at any given time, or people may experience varying degrees of identifiability, feeling "somewhat identifiable" or "very identifiable", etc. If the latter possibility is true, identifiability should be inversely proportional to the number of people performing together and we should detect differences in

loafing among groups of differing size as well as between alone and together conditions. In the present studies, although there is a tendency for people to loaf less in pairs than in the larger groups (69% vs 63% effort in Experiment 5, 81% vs 74% in Experiment 6), these differences did not reach conventional levels of significance.

In summary, identifiability seems to be a very important albeit complex psychological variable that appears to have great implications for human motivation and performance. The present research has clearly demonstrated that identifiability is at least one key determinant of social loafing.

Chapter Six
The Social Enhancement of Performance in Groups

Social loafing conflicts with the idealistic image of the group as being composed of individuals who tend to "pull together" and exert more effort for the collective goal. "In unity there is strength", according to the old motto, and one would hope it would, at least under some circumstances, be true. It would be discouraging to think that group members are necessarily individualistic and concerned for their own welfare above that of the group. Therefore, we sought to determine conditions where being part of a group actually improves individual performance.

The inspiration for the present study came from athletes who participated in our laboratory studies. While our findings suggested decreased individual performance in groups, our research participants believed that in athletic events such as track and swimming, people actually do better in relay races than in individual events. Here would be an instance challenging our laboratory findings.

Our first empirical step was to examine the results of the 1977 Big Ten Intercollegiate Swim Meet to check the validity of participants' hunches. Taking only those individuals who performed in both individual and relay events for the same stroke and distance, we performed an analysis of variance on the lap times of 21 swimmers in the 100 yard freestyle and the 400 yard relay, and 23 swimmers in the 200 yard freestyle and 800 yard relay. As had been suspected by our experimental participants, swimmers' times were significantly faster for relays than for individual events ($Fs = 15.5$ and 11.3, $p's < .005$). Although the differences amounted to only .77 seconds for the 100 yard distance and .74 seconds for the 200, differences of this magnitude often are sufficient to mean a first place finish instead of third or fourth place. For example, in the men's 100-meter freestyle in the 1977 National AAU Championships, the first and fifth place finishers were separated by only 1.07 seconds, and the time difference between the second and fifth place finishers was a mere .22 seconds.

There are two psychological factors that may contribute to this difference. Experiments 5 and 6 have demonstrated that once people's "group" outputs become identifiable, their efforts in groups rise to that of their "alone" efforts. In a swimming relay event, lap times are recorded for each individual. In addition, at the end of each lap it is customary for a timer to shout out the swimmer's lap time so that all members of the relay team will hear. This high degree of identifiability may have helped relay swimmers to perform at least as well as in the individual events.

Secondly, laboratory research to date has focused extensively on "groups" of strangers who have only limited interaction during the experiment and no expectation of seeing each other again, and who have little specific skill at the experimental task or intrinsic motivation to succeed. Varsity swimmers, on the other hand, are highly skilled and motivated,

and belong to a closs-knit, cohesive team. One might speculate that group outcomes rest partially on their effort and that the others in the group depend upon their performance. In the laboratory, on the other hand, where there is little team spirit, when individual outcomes rest upon group performance, it is likely that members of laboratory groups are negatively affected by their awareness that they must depend upon the others for their rewards.

Experiment 7:
Increasing Identifiability Improves Swimming Speed

These considerations provide interesting psychological reasons why people might under some circumstances be willing to work harder for a collective goal than individually. Unfortunately however, the Big Ten swimming data can not be taken as unequivocal support for these possibilities since there is an additional physical factor involved.

Although the first swimmer in a relay starts as do swimmers in individual events, the other three swimmers in the relay use a "flying start" that allows them to anticipate the start, as well as to initiate some movement before timing begins. Coach Dick Sloan of the (Big Ten) University Swim Team estimates that the advantage conferred by a "flying start" is probably around .7 seconds, sufficient to account for the entire difference between individual-event times and relay times.

We decided, therefore, to investigate further the relationship between the above variables and competitive swimming in relays and individual events. Through the cooperation of Coach Sloan and the University Swim Team, we simulated a competitive swimming event with some adjustments so that we could test specific hypotheses. Some swimmers would hear their scores while others would not, all competing in both relays and individuals events. Spectators would be allowed to watch, and rewards would be given. An interaction was predicted to occur between identifiability and event: it was expected that swimmers would be faster in the individual event when individual lap times were unavailable, but when lap times were made available, an individual's relay time would be faster.

Method

Sixteen members of the University Swimming Team were recruited with the assistance of the team's coach to participate in a study on the "dynamics of swimming." The experimenters were not initially identified as psychologists since the research's ostensible purpose was to assess the effect of water turbulence, starting techniques, and timing procedures on performance in a competitive setting. Six additional swimmers (three from the women's team) served as timers and were fully briefed before the study was run.

Four teams of four men each were created by matching for ability and speed based on estimates (to the nearest second) of each swimmer's time for a 100 meter lap which were supplied by the team's coach.

The time trials were held in the University 50 meter pool during one of the team's informal spring practice sessions. Two

of the four teams were randomly assigned to the "low-identifiable" (Low ID) condition while the two remaining teams were assinged to the "high identifiable" (High ID) condition.

Identifiability, in the context of this study, refers to the knowledge, public and private, of an individual's lap time. Swimmers assigned to the High ID teams heard their lap times announced aloud to them (and anyone else within earshot) at the conclusion of each of their laps. Times were not announced in the Low ID condition, and any swimmer who asked his time was told that information was not being made available.

Within each identifiability condition, swimmers competed for individual and team prizes which were awarded to the four fastest individuals and to each member of the fastest relay team. The availability of prizes was thus equal for individual and team competition. The prizes were colorful T-shirts with the words "Social Impact Research Team" emblazoned across the back, and the formula "I = f(SIN)" on the front. For whatever reason, these proved to be popular, and we saw them in use around campus for many months after the event.

Each swimmer raced a total of 400 meters in four events: two 100 meter "individual" freestyle races, and one lap in each of two 400 meter freestyle relays. In order to make the individual 100 meter races directly comparable to one leg of a 400 meter relay, especially with regard to the starts, the individual races were run virtually the same as the relays, the only difference being that the swimmers were reminded in advance of each individual race that their individual times, not the team time, were the times that counted toward winning a prize.

Races were run in lanes 1 and 3 of the 50 meter pool, each team of four in a given identifiability condition assigned to its own lane. All swimmers used an anticipated start, timing their dive into the water to coincide with the finish of the previous swimmer in the same lane. For swimmers in the first position, an extra swimmer approached the starting blocks from approximately 10 meters out in lane 2; initial dives were timed to coincide with this swimmer's "finish." Events were alternated between the High ID condition and the low ID condition and the teams not currently swimming were physically isolated to avoid possible contamination of the between-groups identifiability manipulation.

Consistent with standard coaching practices, a "pure" measure of lap time for each swimmer, regardless of event, was obtained by beginning timing at the first forward movement of the hand once the swimmer was "set" at the starting block. The timers were swimmers themselves, and were accustomed to this technique, which is designed to eliminate the relatively large savings in time over conventional "gun" starts that can be realized by anticipating one's start. Lap times, four per swimmer, constituted the primary dependent measure.

The modifications of standard race format served to provide "clean" lap times, as well as support for the cover story. Empty buffer lanes (lanes 2 and 4) acted to reduce interlane turbulence, and a video camera which was used to record the entire study lent credibility to the researcher's alleged interest in starting technique. Rest periods of approximately 20

minutes each were placed between events involving the same swimmers, the minimum necessary recovery period recommended by the team coach.

After everyone had finished swimming their last laps, team members were gathered together for the purpose of distributing questionnaires. However, the experimenters, due to an unforeseen incident (they were thrown fully clothed into the pool), forgot to administer the questionnaires before the swimmers were debriefed. Although the questionnaires were distributed the following evening at a dinner given in appreciation for their cooperation, the results should be taken with reserve.

Results

Since the study was conducted several weeks after the close of the competitive swimming season, we were mildly concerned about how effectively we would be able to simulate meet conditions and generate an appropriate amount of enthusiasm among our swimmers. Any fears, however, were quickly alleviated at the outset of the experiment. We were pleasantly surprised by the obvious fact that the swimmers were indeed very involved in our "meet," as indicated by their creating slightly obscene team names and cheers. Further anecdotal evidence for our success in simulating actual meet conditions can be found in noting that although (because of the time of year) the swimmers were not in peak condition, their times were remarkably good. In fact, one swimmer beat his own personal record for the 100 meter freestyle during the course of our experiment.

Paper-and-pencil measures. Swimmers in the high ID group reported feeling more identifiable than low ID swimmers, $F(1,14) = 9.8$, $p<.01$. Swimmers indicated putting forth more effort in the relay condition than in individual competition, $F(1,14) = 4.8$, $p<.05$. Furthermore, swimmers felt more pressure to swim their best when competing as part of a relay team, $F(1,14) = 4.8$, p .05.

Swimming data. The crucial data were speed scores for each 100 meters, created by using the reciprocals of the individual elapsed times. We analyzed these data with a 2 X 2 X 2 analysis of variance with identifiability as a between-subjects factor, and individual/relay event and replications as within-subjects factors. As expected, the only significant effect indicated by the analysis was the identifiability individual/relay event interaction: $F91,14) = 5.39$, $p<.04$. Under low identifiability swimmers swam faster in the individual events, than when swimming as a member of a relay team. When swimmers' times were highly identifiable, they swam faster in the relay event. Subsequent F-tests for simple main effects resulted in a single significant comparison: as predicted, in the High ID group times were faster (p .05) in the relay condition than in the individual event condition.

Table 2. Swimming times for individual and relay race under conditions of low and high identifiability

	Relay	Individual
Low Identifiable	61.66	61.34
High Identifiable	60.18	60.95

Discussion

As the results indicate, identifiability of swimmers' scores mediated whether they would swim faster in the individual event or the relay. In line with the findings of Experiments 5 and 6, when persons' scores were unavailable due to their participating in a group (as in the Low ID relay event), less effort was exerted. On the other hand, when scores were highly identifiable, swimmers were faster in the relay. Experiment 6 found that when individual outputs were made identifiable in groups, there was no difference between individual and group performance. That times were faster in relays under high identifiability in the present study could result from cohesive team effort where relay swimmers felt more pressure from their teammates (as suggested by the paper-and-pencil measure) than when swimming individually.

One interesting aspect of this research is that even under conditions of a fairly high degree of competitiveness, the presence of an audience (approximately 28 people throughout the experiment), well-trained athletes, and a relatively small number of participants, a significant interaction was demonstrated. Under these conditions, it is remarkable that a ceiling effect did not cancel out the effects of the experimental manipulations. Therefore, despite the rather small differences in actual times (ranging from .39 seconds to 1.48 seconds) the manipulations do seem to be robust enough to overcome other powerful factors.

From a theoretical standpoint, the results of this study suggest that individual performance in groups is greatly influenced by whether or not the group members' outputs are identifiable. Even with a cohesive team whose members normally feel pressure from their teammates to perform well, when individual outputs are unidentifiable, they reduce their efforts in relays. It appears, then, that experimental "groups" are not as unique as one might think, at least with respect to group effort.

On the practical side, what is news to psychologists seems to be an implicit assumption already made by swimming coaches. It is customary for coaches and timers to shout out swimmers' times as they finish their laps. The results of this study support the use of this technique for relays as well as individual events. One possible suggestion might be to increase the salience that the other members of the team are depending on each person in every event, so that the team will fare well, not only the individuals on the team. In other words, one should try to make the individual events seem more like relays.

In summary, the present study has extended the body of research on individual effort alone and in groups to an area outside the laboratory: individual versus relay events in competitive swimming, where well-trained and highly skilled athletes were observed in a task they enjoyed under conditions of low and high identifiability. In support of laboratory findings, when performing in groups allows people to be less identifiable, they exert less effort. However, under these conditions, when performing in groups is accompanied by surveillance and pressure from the other group members, performance is actually enhanced.

Chapter Seven
Conclusion

We conclude this paper with a discussion of three world cases of social loafing, five questions for further research, three areas of application, and a little homily on social loafing as a social disease.

Some Real World Cases of Social Loafing

Although these cases vary in seriousness and in their relevance to the central issues of our time, they help demonstrate the pervasiveness of the phenomenon and illustrate the importance of identifiability.

Town meetings. In New England, the traditional annual town meeting is still the means of governance for many small towns. Even this last bastion of American democracy may suffer from the effects of social loafing. It appears that fewer of the voters eligible to attend these meetings do so in the larger communities than in the smaller ones. Using records from a 1961 Legislative Research Council study of 116 communities ranging in size from under 500 to over 2000 eligible voters, we find that one-third or more of the eligible voters attended in 45% of the towns with fewer than 1000 eligible voters. No towns with more than 1000 eligible voters achieved this level of attendance, $X2 = 37.1$, $p<.001$.

Although the results of any field study are subject to alternative explanation, the obvious ones do not seem to fit. For example, there is no reason to believe that a lack of seats in the larger towns deterred attendance: there is no relationship between town size and the percent of available seats occupied and fewer than 90% of the seats are occupied in 90% of the towns. We think the data are consistent with the interpretation that in large towns, people perceive that their presence or absence is less likely to be noticed. This feeling of unidentifiability may reduce their sense of obligation to attend town meetings.

Football linemen. Certain members of athletic teams enjoy less limelight than others. Football linemen, for instance, receive relatively little in the way of fan attention or media coverage. Unsung heroes, they work in the trenches while their efforts seem to go unnoticed by all but their running backs and a few linemen on the other team. Our present research might suggest that this lack of identifiability would lead these players not to bust their guts as strenuously as their more visible teammates. However, successful coaches work hard to counteract this tendency. For example, at a(Big Ten) University, movies of each play and player were taken from isolated cameras and viewed by the entire coaching staff and players after each game. The staff screened and graded each play and computed the average percent of perfection of each individual, a score known to teammates and helping determine whether or not a player started the next game. Also, weekly press luncheons were called to announce "Lineman of the week" honors and the award of special decals to adorn players' helmets, signifying their 110% effort on the field to teammates and crowd. Although it is not possible to

test the effectiveness of these tactics directly, this university has long been famous for the holes its linemen tear in opposing defenses.

Pickle packing. Turner (1978) describes the problems facing production line workers in a pickle factory. A key job is stuffing dill pickle halves into jars. Only dill halves of a certain length can be used. Those that are too long will not fit and those that are too short will float and dance inside and look cheap and crummy. The dill halves and the jars are carried past the contingent of pickle stuffers on their respective high speed conveyor belts. If the stuffers don't stuff quickly enough the jars pile up at the worker's stations while they look for pickles of the appropriate length, so stuffers have a great temptation to stuff whatever pickles come readily to hand. The individual outputs of the stuffers are unidentifiable since all jars go into a common hopper before they reach the quality control section. Responsibility for the output cannot be focused on any one worker. This combination of factors leads to poor performance and improper packing. The present research suggests making individual production identifiable and raises the question "How many pickles could a pickle packer pack if pickle packers were only paid for properly packed pickles?" More seriously, even though piece-rate incentive systems may not be the solution to problems of inadequate productivity in factory assembly lines, the example does illustrate the relevance of social loafing to industry.

Five Directions for Further Research

We have reported the results of seven experiments on social loafing. Although we think the findings are interesting and informative, identifying a problem and suggesting its solution, these experiments by no means exhaust the need for research in this area. Instead, they suggest directions for future efforts. Following up on these findings, we think there are a number of important questions, which range from basic and theoretical issues of psychological process to concerns about practical implications for society.

1. What are the psychological processes underlying social loafing? We think the answer to this general question can be found in the answers to several more specific ones: Does diffusion of responsibility make individuals feel less obligation to work hard in groups? Could it be that loss of control over one's outcomes makes individuals feel helpless and lethargic? Is it that lack of identifiability makes individuals less accountable for their contributions? Is the presence of others distracting or does it arouse competing motives? Do individuals feel redundant or superflous when they work with others?

2. On what kinds of tasks and in what kinds of job settings does social loafing occur? We would like to know whether social loafing occurs: on optimizing tasks which call for correctness and accuracy as well as on maximizing tasks which merely reward quantity; on disjunctive and conjunctive tasks where the best or worst individuals determine group success as well as on additive tasks in which each contribution is summed; on divisible tasks in which different people can assume different roles as well as on

unitary tasks where individuals work on the same job; on sequential tasks like assembly lines as well as on simultaneous tasks where individuals work in parallel. We would like to know whether social loafing occurs in interacting groups as well as in independent squads, in long-lived organizations as well as in special task forces, in committees of representatives as well as in departments of colleagues, in competitive teams as well as in cooperative work crews. We would like to know whether social loafing will occur in reactive tasks that require vigilance and monitoring as well as on creative tasks that require initiative and self-pacing; for information-gathering, decision-making, policy-setting tasks as well as tasks involving physical construction or destruction. We would like to know the extent to which social loafing is related to other potentially disruptive social processes such as groupthink, coordination loss, polarization, or conformity.

3. How does loafing relate to job satisfaction and the quality of work life? In its short term effects on production, loafing would seem to have primarily negative effects, especially at the group, aggregate or societal level. It is possible that loafing has more desirable long range or individual consequences. Although the lack of individual recognition and control may lead people to dislike collective tasks, if people prefer work settings that allow them to loaf, this potential may attract them to group tasks. It is therefore important to discover whether social loafing can be eliminated only at the expense of individual satisfaction and enjoyment of the task.

4. Are the forces leading to social loafing moderated and/or modifiable by cultural background, philosophical or political ideology, or personal life history? Some cultures stress the good of the whole-- "Serve the People!" Chinese workers exhort each other-- while others stress individual costs and benefits, as in "The Me Generation." Some families enjoy higher educational opportunities, more material resources, higher social status than others. Some individuals may be more cooperative, higher in ability, more energetic than others. Do such social and individual differences lead to differences in social loafing? If so, it might be possible to create more effective teamwork by selecting members who don't loaf and by retraining those who do.

5. How can the effects of social loafing be neutralized or reversed? Would increasing incentives bring into balance the costs and benefits of group performance? Might increasing the strength, immediacy and number of sources of evaluation increase motivation? Could group cohesion increase feelings of camaraderie, interpersonal trust or esprit de corps? Will an increased sense of identifiability, responsibility or control counteract loafing? What role can leadership play in organizing and motivating collective activity?

Three Areas of Application

As can be seen from these questions, there are many fruitful directions research can take. Further research is needed to help us discover the underlying determinants of individual productivity in group settings and to develop means of encouraging greater productivity while maintaining the quality of

work life. Since so much everyday activity takes place in group settings, this research has obvious practical implications. We conclude by suggesting three areas of research which are interesting for both their theoretical relevance and their potential for applied benefit. In order of increasing complexity, the three types are clerical, involving data handling and word processing, cognitive, involving idea generation and decision making, and organizational, involving coordinating the activities of a number of independent units. Specifically, we think it would be interesting systematically to study the effects of social context on performance in keyboarding text as in a secretarial pool, in using information in making decisions as in an executive committee meeting, and in coordinating efforts and sharing vigilance, as in the interaction between an airplane cockpit crew and an air traffic control center.

Word processing. With the advent of inexpensive microprocessors, typing pools are in the process of undergoing fundamental reorganization. Rather than scattering typewriters throughout an organization, many companies are establishing word processing pools in which each typist sits in front of a terminal which is connected to a central processing unit. This organizational change clearly reduces the extent to which the individual is tied to the source of the work and may be conducive to social loafing. The keyboarding of text thus can be seen as a prototypical job setting for the study of productivity in collective settings. In preliminary work with several small TRS-30 microcomputers programmed to give instructions as well as to record typing production on timed tasks. Fourth quarter typing students at the American Institute of Business in Des Moines were told that they were helping test the feasibility of using the microcomputer as a word processor for small businesses. Half the time, their output was combined with the output of three other people, while the other half of the time it was not combined. The number of words per minute under alone and group conditions as well as questionnaire data related to task enjoyment were recorded, revealing trends toward loafing and non-enjoyment in the group tasks.

Decision making. Many observers have pointed to problems with inadequate or illconsidered decision making as characteristic of committees or groups (e.g. Janis & Mann, 1977). In part, of course, these problems result from interpersonal conflicts, divided or opposing interests, etc. In part, however, they may result from the fact that each individual in a group or committee may not devote his or her full attention and judgment to making sure the decision is correct. Risky shift research focused on the relative riskiness vs. conservativeness of decisions made by individuals or groups. Here we are interested in the relative quality of decisions made under a variety of social contexts.

Measuring the quality of a decision is obviously not an easy task, since the clear vision of hindsight does not really tell you what you should have seen at the time the decision was made. It is possible, however, to measure the extent to which the information available at the time a decision is made is actually used in the making of that decision. Again, computer technology

can be used to measure productivity. Specifically, several bits of information can be presented via computer terminal to individuals who either have the sole responsibility or share the job of deciding on a course of action. Each participant would make a series of such decisions, and the computer would attempt to "capture" their policy through computing the extent to which the final decisions relate to the information provided. High relationships would be taken to indicate greater effort at decision making.

Although we are just beginning work with this paradigm, it has been quite promising. There is also, of course, a fair amount of data indicating that social loafing is in fact a problem with other kinds of cognitive tasks. For example, we know that individuals exert less effort evaluating creative writing when they know that their evaluations will be averaged in with those of other people (Petty, Harkins, Williams & Latane', 1977) and that "focus groups" charged with listing all the possible consequences of increasing the number of females in the army develop fewer good suggestions than comparable numbers of individuals working alone (Fern, 1979).

Aircraft management. The collision of a PSA 727 with a small plane over San Diego in September of 1978 brought widespread attention to the complexities of the nation's air traffic control system and served to point up the extent to which the responsibility for averting midair collisions is divided among several parties. Although the travelling public believes that their safety depends on the viligance of a small number of individuals hunched over radar screens in airport towers, current FAA procedures depend heavily on the concept of "see and avoid" whenever aircraft are in visual meteorological conditions. Even within the cockpit, however, the division of responsibility among the crew may become confused under times of stress and another accident is chalked up to "human resources mismanagement". Compounding the problems associated with the shared responsibilities for vigilance, crews often display a seeming reluctance to communicate their uncertainties over the open radio channels.

Although problems associated with air traffic control are complex and although our present system has evolved on the basis of a great deal of operational experience and will be difficult to change, research into how the social context affects the system's functioning would seem worthwhile. It would be important to know how shared responsibility affects vigilance and complex communication under varying workload. Productivity assumes new meanings when it comes to accident avoidance, but it is likely to be related to similar social factors.

Social Loafing as a Social Disease

Although some people still think science should be value free, we must confess that we think social loafing can be regarded as a kind of social disease. It is a "disease" in that it has negative consequences for individuals, social institutions and societies. Social loafing results in a reduction in human efficiency which leads to lowered profits and benefits for all. It is "social" in that it results from the presence of actions of other people.

The "cure" however, is not to do away with groups, because despite their inefficiency, groups make possible the achievement of many goals which individuals alone could not possibly accomplish. Collective action is a vital aspect of our lives: from the time of the pyramid builders it has made possible the construction of monuments, but today it is necessary to the provision even of our food and shelter.

We think the "cure" will come from finding ways of channeling social forces so that, as in the case of the Israeli kibbutz and the University Swim Team, the group will serve as a means of intensifying individual responsibility rather than diffusing it. We hope that through further study of cheering and clapping and other group tasks, we will be able to discover techniques for getting people to pull together without having to stand over them with a whip. We believe that this would allow the old saying about many hands to be true in still another, more positive way. If we can learn to work together, joyfully as in an old-fashioned community barn-raising, the help of many hands will lighten our hearts.

References

Campbell, M. Group incentive payment schemes: The effects of lack of understanding and group size. Occupational Psychology, 1952, 26 15-21.

Cottrell, N. Social facilitation. In C. McClintock (Ed.), Experimental social psychology, New York: Holt, Rinehart and Winston, 1972.

Criden, Y., and Gelb, S. The kibbutz experience. New York: Schocken books, 1976.

Dashiell, J. F. Experimental studies of the influence of social situations on the behavior of individual human adults. In C. Murchison (Ed.), A handbook of social psychology, Worcester, Massachusetts: Clark University Press, 1935.

Davis, J. H. Group performance. Reading, Massachusetts: Addison-Wesley, 1969.

Eagly, A. Sex differences in influenceability. Psychological Bulletin, 1978, 85, 86-116.

Harkins, S., Latane', B. & Williams, K. Social Loafing: Allocating effort or taking it easy? Journal of Experimental Social Psychology 1980, 16, 457-465.

Ingham, A. G., Levinger, G., Graves, J., & Peckman, V. The Ringelmann effect: Studies of group size and group performance. Journal of Experimental Social Psychology, 1974, 10, 371-384.

Jasny, N. The socialized agriculture of the USSR. Stanford: Stanford University Press, 1949.

Kanovsky, E. The economy of the Israeli kibbutz. Boston: Harvard University Press, 1966.

Kohler, O. Ueber den Gruppenwirkungsgrad der menschliechen Korperarbeit und die Bedingung optimaler Killektivkroftreaktion. Industrielle Psychotechnik, 1927, 4, 209-226.

Latane', B., & Darley, J. M. The unresponsive bystander: Why doesn't he help? New York: Appleton-Century-Crofts, 1970.

Latane', B., Williams, K. & Harkins, S. Many hands make light work: Causes and consequencies of social loafing. Journal of Personality and Social Psychology, 1979, 37, 822-832.

Leon, D. The kibbutz: A new way of life. London: Pergaman Press, 1969.

Marriott, R. Size of working group and output. occupational Psychology, 1949, 23, 47-57.

Moede, W. Die Richtlinien der Leistungs-Psychologie. Industrielle Psychotechnik, 1927, 4, 193-207.

Olson, M. The logic of collective action: Public goods and the theory of groups. Cambridge: Harvard University Press, 1965.

Petty, R., Harkins, S., & Williams, K. The effects of group diffusion of cognitive effort on attitudes: An information processing view. Journal of Personality and Social Psychology, 1890, 38, 81-92.

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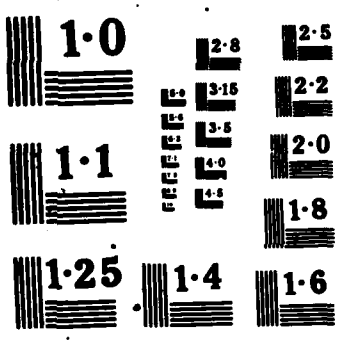

Petty, R., Harkins, S., Williams, K., and Latane', B. The effects of group size on cognitive effort and evaluation. Personality and Social Psychology Bulletin, 1977, 3, 579-582.

Seeking a Stake in Russian Soil. London Time, September 7, 1965, p. 9.

Rosenberg, M. J. The conditions and consequences of evaluation apprehension. In Rosenthal, R. & Rosnow, R. L. (eds.), Artifact in Behavioral Research, New York: Academic Press, 1969.

Seligman, M. Helplessness. San Francisco, Freeman, 1975.

Smith, H. The Russians. New York: Ballantine Books, 1976.

Steiner, I. D. Models for inferring relationships between group size and potential group productivity. Behavioral Science, 1966, 11, 273-283.

Steiner, I. D. Group process and productivity. New York: Academic Press, 1972.

Stevens, S. S. On the psychophysical law. Psychological Review, 1957, 64, 153-181.

Stevens, S. S. Psychophysics: Introduction to its perceptual, neural and social prospects. New York: John Wiley & Sons, 1975.

Stuart, R. The collective farm in Soviet agriculture. Lexington: D. C. Health and Company, 1972.

Turner, S. The life and times of a pickle packer. New England, Boston Sunday Globe, January 8, 1978, pp. 10-22.

Wadekin, K. The private sector in Soviet agriculture. Los Angeles: University of California Press, 1973.

Wicker, A. N. Size of church membership and members support of church behavior settings. Journal of Personality and Social Psychology, 1969, 13, 278-288.

Williams, K., Harkins, S. & Latane', B. Identifiability and social loafing: Two cheering experiments. Journal of Personality and Social Psychology, in press.

Yemelyanov, A. The agrarian policy of the party and structural advances in agriculture. Problems of Economics, 1975, 22, 22-34.

Zajonc, R. B. Social Facilitation. Science, 1965, 149, 269-274.

Zajonc, R. B. Social psychology: An experimental approach. Belmont, California: Brooks/Cole, 1966.

Zimbardo, R. G. The Human choice: Individuation, reason and order versus deindividuation, impulse and chaos. In W. J. Arnold and D. Levine (Eds.), Nebraska symposium on motivation, Lincoln: University of Nebraska Press, 1969.

APPENDIX C

APPENDIX C
LIST OF UNITS ADMINISTERED TO 83-85 CAPS RESPONDENTS

BACKGROUND
*BACKGROUND: where grew up (characteristics of place), high school activities, college residence and activities
*FAMILY SOCIAL CLASS BACKGROUND: perceived family social class measures, also educational aspirations

PERSONALITY
*MMPI HOSTILITY SCALE: (two replications)
*MARLOW-CROWNE SOCIAL DESIRABILITY SCALE: (two replications)
*GOUGH ADJECTIVE CHECKLIST
CALIFORNIA PSYCHOLOGICAL INVENTORY
INTERPERSONAL BEHAVIOR INVENTORY
*TYPE A ADJECTIVE CHECKLIST
*BAUCOM MASCULINITY FEMININITY SCALE: (from CPI)
*SHYNESS AND SOCIABILITY
*PHILOSOPHIES OF HUMAN NATURE
*SENSATION SEEKING
*BEM MASCULINITY-FEMININITY
*SMOKER SCALE (sensation seeking)
SELF SEMANTIC DIFFERENTIAL
NC I-E SCALE
MULTIDIMENSIONAL MULTIATTRIBUTIONAL SCALE: an I-E scale
*SELF MONITORING
CES-DEPRESSION SCALE
TENNESSEE SELF CONCEPT SCALE
ATTRIBUTIONAL STYLES QUESTIONNAIRE
EVALUATIVE STRESS SCALE
CONSERVATISM SCALE: F scale and other measures of conservatism
*ANGER-GUILT COPING SCALE
HAPPINESS SCALE
*JOHN HENRYISM SCALE: achievement motivation

SOCIAL SUPPORT
SOCIAL SUPPORT SCALE: # friends and how much confide in them
CRISIS QUESTIONNAIRE: description of a recent bad event and how R coped with it, who R talked to about it and how they helped
*COHEN-HABERMAN SOCIAL SUPPORT SCALE
*UCLA LONLINESS SCALE
DATING QUESTIONNAIRE

LIFE EVENTS/STRESS
GOOD/BAD EVENT QUEST: R responds to questions designed to induce a good or bad mood, then to a mood quesitionnaire
HASSLES AND UPLIFTS QUESTIONNAIRES: lists good and bad events.. R tells frequency with which each has occured in the last month
*PERCEIVED STRESS SCALE

*POLITICAL ATTITUDES: ideology, party id, candidate preferences, political knowledge, media use, voting in 84 election

ATTITUDES ABOUT OLD PEOPLE AND DEATH
TEMPLER DEATH SCALE: feelings about death and dying

ATTITUDES ABOUT OLD PEOPLE: (three scales)

ATTITUDES ABOUT RACE AND SEXROLES
EQUITY QUESTIONNAIRE: attitudes about affirmative action policies
INTERRACIAL QUEST.: stereotypes about interracial couples
SYMBOLIC RACISM SCALE
REDNECK PREJUDICE SCALE
ATTITUDES ABOUT COMPARABLE WORTH
MANAGEMENT ATTITUDES: gender stereotypes and self descriptions
GENDER TERM SEMANTIC DIFFERENTIAL: SDs on 300 gender terms
SEX-ROLE QUESTIONNAIRE: sex-role attitudes
ATTITUDES TOWARD WOMEN: (3 units), equal opportunity, rape, etc.

COLLEGE VARIABLES
*HONOR SYSTEM QUESTIONNAIRE: Rs observations of academic cheating
GRADES: expected grades, study habits, class attendance, parent's concern about grades
*ACTUAL ACADEMIC RECORDS: not from Rs responses, but from official university records, includes SAT scores, GPA, major, credit hours
*COLLEGE CASH: college and personal finances of respondents
STUDENT ACTIVITIES SCALE: student use of univ. resources

PHYSICAL ATTRIBUTES
HEALTH QUESTIONNAIRE: illness, nutrition and exercise habits
PHOTO QUESTIONNAIRE: Rs ratings of each other's photographs on 4 scales..attractiveness, intelligence, studiousness, agreeableness
PHYSICAL: physical self description, grooming habits

RELIGIOUS
CONVENTIONAL RELIGIOUS ATTITUDES SCALE
RELIGIOSITY QUESTIONNAIRE: (2 units)

FAMILY
FAMILY ENVIRONMENT SCALE
FAMILY CONFLICT QUESTIONNAIRE
FAMILY COHESION AND EXPRESSIVENESS SCALE

VALUES
CHINESE AND AMERICAN VALUES SCALES
TRIANDIS VALUES QUESTIONNAIRE
TRADITIONAL VALUES SCALE

SPORTS
SPORTS QUIZ: measures sports knowledge of rules and personalities
SPORTS IDENTITIES QUEST.: how well a number of sports identity terms desribe R's self and ideal self
SPORTS SEMANTIC DIFFERENTIAL: (2 units) Rs rate self, ideal self, and several sports identities on semantic differential scales
SPORTS MEMORABILIA: items of sports memorabilia owned
PERCEPTIONS OF FEMALE ATHLETES
ATHLETIC PARTICIPATION

OTHER

*MEDIA USE: description of tv, radio, newspaper and magazine habits
*TV VIEWING HABITS
*GROUP DECISIONMAKING TASKS: Lunar and Arctic Survival Tasks
*TELECONFERENCING: Actual content of respondents' mail to each other.
JOURNALISTIC CONTENT AND READER ENJOYMENT
*GENDER STEREOTYPES AND NAMING CONVENTIONS
RISK PREFERENCE IN PORTIFOLIO SELECTION: investment decisions
MONETARY VALUATION OF TIME
RACIAL ATTITUDES
INCOME TRANSFER DECISIONS
*1984 ELECTION STUDY
ATTITUDES ABOUT TAXES
CORRELATES OF STRESS
SELF-RATING SCALES
SOURCES OF INFLUENCE IN CANDIDATE PREFERENCE
GENDER STEREOTYPES AND MANAGEMENT
COMPARISON INFORMATION IN PERFORMANCE EVALUATION
INTERPERSONAL POWER AND SOCIAL SUPPORT
EQUITY AND AFFIRMATIVE ACTION
ATTITUDES TOWARD INTERRACIAL COUPLES
EVALUATION OF SPEAKER CHARACTERISTICS
TIME DIARY STUDY: detailed records of 8 days during the academic year

SOCIAL LOAFING STUDIES

*SOUND PRODUCTION: physical effort task
COUNTING: cognitive attention task
*RESTAURANT CHOICE: information search, decisionmaking
AUTO CHOICE: information search, decisionmaking
RESTAURANT RATING TASK: information processing
BRAINSTORMING: idea production
BRAINSTORM JUDGING: evaluation task
*ANAGRAMS: production task
*WORDMATCHES: timed production task
VIGILANCE TASK

*=administered in both 1983-84 and 1984-85

END

DTIC

7-86