Survey of Leisure Time Activity

Implications for the Design of a Space Vehicle

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THIS SURVEY is related to the results of the researches of Bexton[1] and Gerathewohl[3] dealing with the effects of isolation and restricted environment on human performance. These and other data[4,5] show that generally men subjected to isolation or a restricted environment tend to become anxious, suffer impaired judgment and experience vivid hallucinations.

Because man can live and work effectively on earth, it was assumed that he could live and work effectively in the artificial environment of a space vehicle if he were given work appropriate to his ability and education, were given adequate opportunity for rest, and were permitted to engage in the same leisure time activities that he engaged in on earth. The purpose of this survey was to determine what kinds of leisure time activities people engaged in regularly and if adequate facilities could be provided to enable men to carry on the same activities in the crew quarters of a space vehicle.

METHOD

To obtain data to use in solving the above problem, it was decided to study the leisure time activity of engineering department personnel of the Westinghouse Air Arm Division. Eighty male subjects participated in the survey. The subjects ranged in age from nineteen to fifty-six. The median age was thirty years, and the distribution was approximately normal. The educational background of the subjects ranged from four years of high school to completion of postgraduate training. The modal academic degree was the Bachelor's degree, typically in engineering, with the Master's degree second in frequency. The work specialty of the eighty subjects was as follows: Systems engineering, 18; Design engineering, 18; Technical publications, 17; Computer programming, 10; Engineering support, 5; Human factors, 3; Mathematics, 3; Physics, 2; and others, 4. Assuming that the selection criteria of Project Mercury are used to select all space crewmen, the major disqualifying characteristic of our sample is lack of flight experience.

The data were collected by means of a questionnaire consisting of three open-ended type items dealing with the subject's activity and one biographical item. These items were presented in the same order to all subjects. The questionnaire was prefaced by a note explaining the true purpose of the survey. One hundred of the questionnaires were distributed to various departments by supervisory personnel who invited the subjects to participate and to complete the questionnaire before discussing the items with anyone. Participation in the survey was optional. The eighty completed forms were returned to the persons who distributed them, and in turn to the experimenter.

RESULTS

The data were analyzed by counting the number of times a given leisure time activity, athletic activity, or item of equipment occurred in the sample. Thus, the data represented the relative frequency of subjects who listed any given activity.

Table I contains a list of the various classes of leisure time activity reported by the subjects in response to the third item of the questionnaire.

From the Human Factors Laboratory, Air Arm Division, Westinghouse Electric Corporation, Baltimore, Maryland.

TABLE I. RANK ORDER OF LEISURE TIME ACTIVITIES

Rank	Activity	Relative Frequency (F/N)
1	Reading	.725
2	Television	.300
3	Musical activities	.275
4	Manual activities	.213
5	Playing bridge	.163
6	Educational activities	.150
—	Miscellaneous work	.125
—	Social activities	.125
9	Travel and driving	.100
—	Family activities	.100
—	Photography	.100
12	Sports	.088
—	Hunting and fishing	.088
14	Gardening	.075
15	Chess	.063
16	Art activities	.050
17	Playing golf	.038
—	Sailing	.038
—	Solving crossword puzzles	.038
—	Walking	.038
21	Making models	.025
—	Attending movies and plays	.025
23	All others	.025

These data were further classified in terms of four categories of activity: (1) Sedentary activities, such as watching TV, listening to music, talking, writing, reading, cards, chess, study, art, and musical and manual activities; (2) Non-sedentary activities, such as dating, driving, traveling, gardening, and family, social, and sex activities; (3) Exercise, such as sailing, golf, bowling, hunting, fishing, and walking; and (4) Energetic activities, such as basketball, softball, tennis, swimming, and water skiing. The relative frequency of subjects who reported as engaged in these four classes of activity is shown in Table II.

The table shows that nearly all of the subjects engaged in sedentary activities with less than half reporting non-sedentary activities and only a small proportion engaging in exercise and energetic activities. The table suggests that to a certain extent fewer subjects engaged in an activity as more energy was required to participate in it.

The data resulting from the second item which asked the subject to list his preferences in athletic activities were analyzed as described above. Table III contains the relative frequency of subjects who reported that they like a given athletic activity.

TABLE II. RELATIVE FREQUENCY OF FOUR CATEGORIES OF LEISURE TIME ACTIVITIES

Category	Relative Frequency (F/N)
Sedentary activity	.963
Non-sedentary activity	.400
Exercise activity	.150
Energetic activity	.075

TABLE III. RANK ORDER OF PREFERRED ATHLETIC ACTIVITIES

Rank	Activity	Relative Frequency (F/N)
1	Swimming	.463
2	Base/Softball	.425
3	Football	.413
4	Basketball	.350
5	Tennis	.275
6	Bowling	.263
7	Table tennis	.238
8	Golf	.213
9	Hiking/Walking	.150
10	Boating/Sailing	.113
11	Hunting/Fishing	.100
—	Badminton	.100
13	Volleyball	.050
14	All others	.050

The relative frequency of subjects who reported participating in a given athletic activity appears in Table IV.

TABLE IV. RANK ORDER OF ATHLETIC ACTIVITIES PARTICIPATED IN MOST FREQUENTLY

Rank	Activity	Relative Frequency (F/N)
1	Swimming	.288
2	Bowling	.188
3	Football	.175
—	Basketball	.175
5	Base/Softball	.163
6	Table tennis	.150
7	Golf	.138
8	Tennis	.100
—	Hiking/Walking	.100
10	Boating/Sailing	.088
—	Hunting/Fishing	.088
12	Badminton	.063
—	Exercise	.063
14	Weight lifting	.050
—	Water skiing	.050
—	Skating	.050
17	Handball	.038
18	Volleyball	.025
—	Gymnastics	.025
—	Darts	.025
21	All others	.025

A comparison of Tables III and IV reveals that the subjects as a group tended to participate more frequently in the activities they liked best.

The data resulting from the first item which asked the subject to list equipment he would take on a hypothetical space trip were analyzed as described above and are shown in Table V. When Tables I and V are compared, it can be seen that the subjects of this survey tended to select equipment for the hypothetical space mission generally in agreement with their leisure time activities. One exception was chess, which ranked low as a leisure activity and high as an item of equipment on a space mission.

TABLE V. RANK ORDER OF EQUIPMENT DESIRED FOR HYPOTHETICAL SPACE JOURNEY

Rank	Equipment	Relative Frequency (F/N)
1	Books	.925
2	Playing cards	.613
3	Chess	.525
4	Musical instruments	.425
5	Record equipment	.413
6	Handicraft equipment	.313
7	Art supplies	.288
8	Writing supplies	.275
9	Athletic equipment	.263
10	Puzzles and games	.250
11	Photographic supplies	.225
12	Flowers and pets	.063
—	Sex responses	.063
—	Food and drug responses	.003

DISCUSSION

The data show that reading, watching TV, musical, manual or handicraft, educational, miscellaneous work and social activities account for all the different types of activities reported by more than 10 per cent of the eighty subjects. By focusing on activities more frequently engaged in, we are not ignoring the less popular pursuits. It is intended here to disregard the activities participated in less frequently in order to suggest how provision may be made for the more popular activities. Of these eight activities, none is obviously excluded from consideration as leisure activity in a space cabin, although social activities, reported by 13 per cent of our sample, may be somewhat difficult to manage, especially for one-man crews.

To permit the space crewmen to read and study, a micro-film library could be designed into the space vehicle. Likewise, tape record libraries, perhaps supplemented by a communication system from an earth base could serve to supply the crew with TV-type entertainment and music as well as news from home. Supplies of materials, probably of the re-usable variety, could be included in the space vehicle to permit those persons who engage in leisure time handicraft and manual activities to continue them during a space mission.

With regard to the data on preferred athletic activities more frequently participated in, it is obvious that such activities as swimming, softball, basketball, tennis, bowling, table tennis, golf, hiking, and boating are out of the question in a space cabin. Therefore, if facilities for any type of exercise are to be designed into the space vehicle, the activity itself is not likely to be one of those which are frequently participated in and well liked.

Consideration of leisure time activity equipment in the design of a space cabin should reduce the need for personal equipment, saving more of the vehicle's payload for other equipment and at the same time resulting in a better, more liveable crew compartment. This, of course, is speculation, but the results of tests[2] with five men for 120-hour periods suggest that a properly designed cabin resulted in reasonably efficient performance and interpersonal relations that were not unbearable.

If we suppose that our sample has similar characteristics to the population from which space crewmen will be selected some day—a supposition we are not prepared to argue, mainly because of the lack of flight experience of the subjects—it can be seen that facilities for leisure time activity and exercise may be provided and the problems uncovered by research on the effects of isolation and restricted environment

on human behavior may be side-stepped to some extent, if not avoided, by proper "human engineering" of the space vehicle.

SUMMARY

The general purpose of the study was to furnish data to be used in a study project dealing with human factors in space flight. The specific problem was to determine if it were possible to provide facilities which would enable a space crewman to spend his off duty hours on a space mission in a way similar to his everyday life on earth.

Certain rather tenuous assumptions were made about space crews and their eventual similarity to our sample, and about developments in equipment integration in space crew quarters. All of these assumptions tend to qualify the conclusion that the proper human engineering of a space cabin can reduce the effects of isolation and a restricted environment on human performance.

REFERENCES

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AIR-BORNE INVALIDS

One of the many services provided by the British Overseas Airways Corporation is that undertaken by its admirable medical department in advising doctors about the transport of invalids by air. As Dr. K. G. Bergin, the Corporation's Director of Personnel and Medical Services, points out in a recently published pamphlet, The Transport of Invalids by Air, "The advent of fast and comfortable pressurized aircraft, powered by turbine engines and flying high above the weather, has made air travel the preferred method of transporting almost all categories of invalids over medium and long distances." Not only is it the most desirable method of transport, in many cases it may be life-saving.

The increasing extent to which it is being used is shown by some figures quoted by Dr. Bergin. In 1959, BOAC alone carried approximately 4000 invalids, which represents slightly less than 1 per cent of all passengers. Even more significant is the fact that of the inquiries received concerning the carriage of invalids, only around 2 per cent of cases were not accepted for air travel on medical or associated grounds. The services provided by BOAC, when required, include the attendance of doctors or the administration of drugs en route, the provision of certain items of medical equipment and oxygen sets, nursing facilities, and ambulance services at the departure and arrival airports. Full details of the indications and contraindications to air travel by invalids are supplied in Dr. Bergin's pamphlet, copies of which can be obtained, free of charge, on application to: Director of Personnel and Medical Services, British Overseas Airways Corporation, London Airport, Hounslow, Middlesex. Practitioners would be well advised to avail themselves of the opportunity of obtaining authoritative advice on a problem with which they may be faced at any time during the course of their work.—*The Practitioner*, March, 1961.