learning situations with retardates require further clarification. A program of research is under way to refine these procedures and, thus, establish efficient techniques for modifying the language usage of retarded children.

REFERENCES

LIEBERT, R. M., ODOM, R. D., HILL, J. H., & HUFF, R. L. Effects of age and rule familiarity on the production of modeled language constructions. *Developmental Psychology*, 1969, 1, 108-112.

ODOM, R. D., LIEBERT, R. M., & HILL, J. H. The effects of modeling cues, reward, and attentional set on the production of grammatical and ungrammatical syntactic constructions. *Journal of Experimental Child Psychology*, 1968, 6, 131-140.

NOTES

1. The study was supported by Department of Health, Education, and Welfare Grant No. RD-2952-S from the Social and Rehabilitation Service.

2. The contributions of the first two authors were equal.

3. We wish to express our thanks to the staff of the Williamson County schools, without whose cooperation this study would not have been possible.

opposite may be true. That is, those who are in control of their environment tend to be less risky than those who are not in control.

Consider, for example, current developments in higher education. Who is it today that is more anxious to make changes in the traditional methods? Is it the "Establishment," the administrators in control of the system? Or is it the students who do not feel that they have enough say in controlling their educational environment? Similarly, in business, it typically appears to be the younger executives, more than the senior executives in control of the company, who are willing to innovate, to try out new products and new ideas. And as young executives become senior executives, as they move onto the board of directors, and as they gain more control, do they then tend to become more conservative or more risky? Observations indicate that they usually become more conservative.

There are other areas in which people who are not in control of their environment appear more willing to take risks than those who are in control, e.g., areas of politics, war, and competitive sports. Since we can observe this phenomenon so often in real life, why do many laboratory studies of risk taking indicate that more risk is taken by those who feel that they are in control of their environment?

The conditions producing risky decision making in the kinds of real-world situations described above may differ from the psychological laboratory studies in several ways: (1) most such real-world situations involve conflict—the people not in control want to gain control; (2) potential loss and gain is likely to be greater in the real world; (3) there is probably greater personal involvement of the decision makers in the real world (since careers, fortunes, and lives are often at stake); and (4) outcomes of decisions in the real world are more complex, based on interacting multiple determinants rather than on a single determinant (such as the roll of a die).

Unfortunately, it is difficult, if not impossible, to subject real-world decision making to experimental control. How, then, can we resolve the dilemma? How can we study risk taking and perceived control as they relate to real-world situations? It may be helpful to employ an experimental simulation setting with "real-world-like" components and experimental variable control. Although it is not possible to introduce the extent of gain and loss found in the real world into a simulation, it has been frequently demonstrated that the participants in such a simulation experience considerable involvement. In addition, they are faced with a more complex environment than most laboratory studies on risk taking provide; and, in the simulation used in this

Perceived control and riskiness¹

KENNETH L. HIGBEE and SIEGFRIED STREUFERT, *Purdue University, Lafayette, Ind. 47907*

Twenty undergraduate students were placed in a complex decision-making situation, involving a simulated international conflict which approximates real-world decision making in many aspects. The analysis of the Ss' economic decisions indicated that those Ss who perceived that conditions in the simulated environment were due to their own decisions tended to take fewer risks than Ss who perceived that conditions were due to forces beyond their control.

Several studies have indicated that people

are willing to take greater risks when they feel that they have control over the outcomes of their decisions (skill orientation) than when they feel that the outcomes of their decisions are due to forces beyond their control (chance orientation). Cohen (1960) provides illustrations of a variety of contexts in which Ss preferred risk-taking situations where the possibility of control existed. Littig (1962), using a pinball machine, and Strickland, Lewicki, & Katz (1966), using dice, also obtained results suggesting that a skill orientation may lead to greater risk taking than a chance orientation.

However, there are many real-life decision-making situations in which just the

study, there is a conflict in which the Ss are attempting to gain control of their situation.

Thus, in this paper, we are concerned with the riskiness of group decision making, as it relates to the Ss' perceived control over their environment, in a complex decision-making environment.

SUBJECTS

The Ss in this study were 20 undergraduate students at a large midwestern university. They participated in 10 pairs, and were paid for participation.

TASK

The Ss were placed in pairs in the tactical and negotiations game (TNG), a complex decision-making environment developed by Streufert and others (Streufert, Castore, & Kliger, 1967; Streufert, Clardy, Driver, Karlins, Schroder, & Suedfeld, 1965; Streufert, Kliger, Castore, & Driver, 1967). In the TNG, Ss are given the responsibility of making group decisions concerning military, economic, intelligence, and diplomatic affairs in a simulated small-scale international conflict with some Vietnam characteristics.

The teams participated in the TNG simulation for four consecutive ½-h periods. During each playing period, they made written decisions on "decision forms," including a statement of purpose and rationale for each decision. They also received information concerning the results of their decisions on "report forms." At the end of each ½-h playing period, Ss filled out an "interim report form," on which they indicated, among other things, the extent (in percentages) to which they felt that their present situation was due to each of five causes: "decisions made by your own team," "decisions made by the enemy team," "various chance factors," "characteristics of the environment," and "arbitrary decisions made by the judges [Es]." The first category—decisions made by your own team—represents the perceived control of the Ss over their situation; the other four categories involve forces beyond the Ss' control. Thus, the term "attribution of causality" in this paper refers to the extent to which Ss viewed their own decisions as responsible for the situation in which they found themselves during various points in time while the TNG was progressing.

DATA COLLECTION

The data for attribution of causality were obtained from the percentage estimates described above. Since these values have artificial ceilings, an arc sine transformation was performed on them before analyses.

Risk-taking scores were obtained from the economic decisions made by the Ss. Although previous research in the TNG setting has utilized economic and military risk-taking measures (Streufert & Streufert, 1968a, b), we will be concerned, in this

Fig. 1. Ss' perceived control of environmental characteristics and riskiness in economic decision making.

paper, only with economic risk taking, since most previous research on risk taking has involved economic variables (e.g., betting and investing). Each economic decision was classified as risky or nonrisky, based on the decision text and on the rationale for the decision prepared by the Ss. Economic decisions were considered risky if funds were invested in projects where obtaining the desired effect was uncertain (i.e., where there was a lack of certainty and the prospect of a loss in the investment).²

Each individual had an attribution-of-causality score, since Ss filled out the interim report forms individually. However, there was only one set of risk scores for each team, since they made decisions jointly. Thus, each member of each team was assigned the same set of risk scores, representing the number of risky decisions made by his team during each of the four periods.

RESULTS AND DISCUSSION

The Ss were divided into two groups of 10 each, based on their attribution-of-causality scores. The high group had a mean attribution score of 60.8%, and the low group had a mean attribution score of 24.8%. The risk scores of these two groups were then compared in a two-way analysis-of-variance design—attribution group (between) by periods of TNG (within).

The high-attribution group made a total of 13 risky decisions. The low group was more risky, with a total of 25 risky decisions. The difference between the two groups in number of risky decisions was significant ($F = 6.97$, $df = 1/18$, $p < .05$). Although the main effect for periods was not significant, there was a significant Attribution by Period interaction ($F = 3.98$, $df = 3/54$, $p < .05$), indicating that the two groups behaved differently over time (over the four playing periods). The nature of this interaction is illustrated in Fig. 1; the high group started out considerably less risky than the low group. With progression in time, both groups converged towards a common level of risk.

The main finding of this study—that Ss who perceive that they have control over their environment tend to be less risky than Ss who feel that they do not have control over their environment—suggests that economic decision-making behavior in a complex situation approximating real-world conditions may be different from parallel behavior in simple betting tasks. The findings of laboratory studies on risk taking may still hold for some kinds of real-world behavior, such as gambling, but might not apply to more complex behavior.

Future research along two lines may be profitable. First, the simulation method employed in this research lies somewhere between the lab and the real world in its degree of realism. The present findings suggest that it may be beneficial to attempt more careful study of real-world behavior to ascertain when the relationship suggested in this paper and when relationships found in standard lab experiments might apply. Second, the present study has been concerned with economic risk taking, in order to be comparable with lab studies on betting. Investigations in other areas, such as military decision making, sports, or business decisions, may aid in determining the generality of the present finding.

REFERENCES

- COHEN, J. *Chance, skill, and luck*. Baltimore: Penguin, 1960.
- LITIG, L. W. Effects of skill and chance orientations on probability preferences. *Psychological Reports*, 1962, 10, 67-70.
- STREUFERT, S., CASTORE, C. H., & KLIGER, S. C. A tactical and negotiations game: Rationale, method, and analysis. Rutgers University: ONR Technical Report No. 1, 1967.
- STREUFERT, S., CLARDY, M. A., DRIVER, M. J., KARLINS, M., SCHRODER, H. M., & SUEDFELD, P. A tactical game for the analysis of complex decision making in individuals and groups. *Psychological Reports*, 1965, 17, 723-729.
- STREUFERT, S., KLIGER, S. C., CASTORE, C. H., & DRIVER, M. J. A tactical and negotiations game for the analysis of decision integration across decision areas. *Psychological Reports*, 1967, 20, 155-157.
- STREUFERT, S., & STREUFERT, S. C. Information load, time spent, and risk taking in complex decision making. *Psychonomic Science*, 1968a, 13, 327-330.
- STREUFERT, S., & STREUFERT, S. C. Risk taking in military and economic decision making: An analysis via an experimental simulation. Purdue University: ONR Technical Report No. 16, November, 1968b.
- STRICKLAND, L. H., LEWICKI, R. J., & KATZ, A. M. Temporal orientation and perceived control as determinants of risk taking. *Journal of Experimental Social Psychology*, 1966, 2, 143-151.

NOTES

1. Research support from the Office of Naval Research, Group Psychology Branch, is gratefully acknowledged.
2. For more detailed descriptions of the scoring procedure, see Streufert & Streufert (1968a, b).