

individuals are most likely to fit into military jobs demanding certain sorts of psychological orientation and certain sorts of interpersonal relations. It would be a mistake, for example, to assign the individual who is a chronic rebel and a chronic distruster of people, to a military job demanding intense and intimate cooperation. Nor should the completely passive and compliant soul be put in units where the individual is called on for initiative and ingenuity. At least, at the level of fantasy, it now seems possible to predict who is the rebel and who is the conformist and who can be either if the situation demands it.

3. *The study of followers, leaders, and situation in one frequently occurring kind of military group.* It may be advisable to concentrate on one type of military group and intensively to study in that group the leader-follower relation. For example, if the study were done on submarine crews, the procedure might be to study the characteristics of the social organization and of the psychological situation aboard a submarine, to examine the pressures and requirements exerted upon crew members, to study the function and personality of officers and to seek for interrelational factors. One would expect that in the submarine situation, where interdependence is great, where interaction is intimate, and where the visibility of the end product and the means of achieving it are high, there will be unique demands made on members of the group. There will be unique leader-oriented needs. And the leader-follower relation will be sufficiently delineable to allow for the eventual selection of both those leaders and followers who are personally equipped to participate comfortably and effectively in it.

Which of these or other alternate plans will be followed will be determined by (a) opportunity and (b) the decision reached when the best obtainable wisdom has been brought to bear on the problem of detailed planning.

This report is a summary of only part of the research that has been done under this project. From its inception, this study of leadership has been a collaborative enterprise. In addition to the author, among the most direct contributors to the present paper have been the following personnel on the staff of the Institute for Research in Human Relations: John N. Patterson, Barney Korchin, Harry J. Older, Emily L. Ehle, Irwin M. Rosenstock and Doris M. Barnett.

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EFFECTS OF GROUP PRESSURE UPON THE
MODIFICATION AND DISTORTION
OF JUDGMENTS

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WE SHALL HERE DESCRIBE in summary form the conception and first findings of a program of investigation into the conditions of independence and submission to group pressure. This program is based on a series of earlier studies conducted by the writer while a Fellow of the John Simon Guggenheim Memorial Foundation. The earlier experiments and the theoretical issues which prompted them are discussed in a forthcoming work by the writer on social psychology.

Our immediate object was to study the social and personal conditions that induce individuals to resist or to yield to group pressures when the latter are perceived to be *contrary to fact*. The issues which this problem raises are of obvious consequence for society; it can be of decisive importance whether or not a group will, under certain conditions, submit to existing pressures. Equally direct are the consequences for individuals and our understanding of them, since it is a decisive fact about a person whether he possesses the freedom to act independently, or whether he characteristically submits to group pressures.

The problem under investigation requires the direct observation of certain basic processes in the interaction between individuals, and between individuals and groups. To clarify these seems necessary if we are to make fundamental advances in the understanding of the formation and reorganization of attitudes, of the functioning of public opinion, and of the operation of propaganda. Today we do not

possess an adequate theory of these central psycho-social processes. Empirical investigation has been predominantly controlled by general propositions concerning group influence which have as a rule been assumed but not tested. With few exceptions investigation has relied upon descriptive formulations concerning the operation of suggestion and prestige, the inadequacy of which is becoming increasingly obvious, and upon schematic applications of stimulus-response theory.

The bibliography lists articles representative of the current theoretical and empirical situation. Basic to the current approach has been the axiom that group pressures characteristically induce psychological changes *arbitrarily*, in far-reaching disregard of the material properties of the given conditions. This mode of thinking has almost exclusively stressed the slavish submission of individuals to group forces, has neglected to inquire into their possibilities for independence and for productive relations with the human environment, and has virtually denied the capacity of men under certain conditions to rise above group passion and prejudice. It was our aim to contribute to a clarification of these questions, important both for theory and for their human implications, by means of direct observation of the effects of groups upon the decisions and evaluations of individuals.

THE EXPERIMENT AND FIRST RESULTS

To this end we developed an experimental technique which has served as the basis for the present series of studies. We employed the procedure of placing an individual in a relation of radical conflict with all the other members of a group, of measuring its effect upon him in quantitative terms, and of describing its psychological consequences. A group of eight individuals was instructed to judge a series of simple, clearly structured perceptual relations—to match the length of a given line with one of three unequal lines. Each member of the group announced his judgments publicly. In the midst of this monotonous "test" one individual found himself suddenly contradicted by the entire group, and this contradiction was repeated again and again in the course of the experiment. The group in question had, with the exception of one member, previously met with the experimenter and received instructions to respond at certain points with wrong—and unanimous—judgments. The errors of the majority were large (ranging between $1\frac{1}{2}''$ and $1\frac{3}{4}''$) and of an order not encountered under control conditions. The outstanding person—the

critical subject—whom we had placed in the position of a *minority of one* in the midst of a *unanimous majority*—was the object of investigation. He faced, possibly for the first time in his life, a situation in which a group unanimously contradicted the evidence of his senses.

This procedure was the starting point of the investigation and the point of departure for the study of further problems. Its main features were the following: (1) The critical subject was submitted to two contradictory and irreconcilable forces—the evidence of his own experience of an utterly clear perceptual fact and the unanimous evidence of a group of equals. (2) Both forces were part of the immediate situation; the majority was concretely present, surrounding the subject physically. (3) The critical subject, who was requested together with all others to state his judgments publicly, was obliged to declare himself and to take a definite stand vis-à-vis the group. (4) The situation possessed a self-contained character. The critical subject could not avoid or evade the dilemma by reference to conditions external to the experimental situation. (It may be mentioned at this point that the forces generated by the given conditions acted so quickly upon the critical subjects that instances of suspicion were rare.)

The technique employed permitted a simple quantitative measure of the "majority effect" in terms of the frequency of errors in the direction of the distorted estimates of the majority. At the same time we were concerned from the start to obtain evidence of the ways in which the subjects perceived the group, to establish whether they became doubtful, whether they were tempted to join the majority. Most important, it was our object to establish the grounds of the subject's independence or yielding—whether, for example, the yielding subject was aware of the effect of the majority upon him, whether he abandoned his judgment deliberately or compulsively. To this end we constructed a comprehensive set of questions which served as the basis of an individual interview immediately following the experimental period. Toward the conclusion of the interview each subject was informed fully of the purpose of the experiment, of his role and of that of the majority. The reactions to the disclosure of the purpose of the experiment became in fact an integral part of the procedure. We may state here that the information derived from the interview became an indispensable source of evidence and insight into the psychological structure of the experimental situation, and in particular, of the nature of the individual differences. Also, it is not justified or advisable to allow the subject to leave without giving him a full ex-

planation of the experimental conditions. The experimenter has a responsibility to the subject to clarify his doubts and to state the reasons for placing him in the experimental situation. When this is done most subjects react with interest and many express gratification at having lived through a striking situation which has some bearing on wider human issues.

Both the members of the majority and the critical subjects were male college students. We shall report the results for a total of fifty critical subjects in this experiment. In Table 1 we summarize the successive comparison trials and the majority estimates.

TABLE 1
Lengths of Standard and Comparison Lines

Trials	Length of Standard Line (in inches)	Comparison Lines (in inches)			Correct Response	Group Response	Majority Error (in inches)
		1	2	3			
1	10	8¾	10	8	2	2	-
2	2	2	1	1½	1	1	-
3	3	3¾	4¼	3	3	1*	+¾
4	5	5	4	6½	1	2*	-1.0
5	4	3	5	4	3	3	-
6	3	3¾	4¼	3	3	2*	+1¼
7	8	6¼	8	6¾	2	3*	-1¼
8	5	5	4	6½	1	3*	+1½
9	8	6¼	8	6¾	2	1*	-1¾
10	10	8¾	10	8	2	2	-
11	2	2	1	1½	1	1	-
12	3	3¾	4¼	3	3	1*	+¾
13	5	5	4	6½	1	2*	-1.0
14	4	3	5	4	3	3	-
15	3	3¾	4¼	3	3	2*	+1¼
16	8	6¼	8	6¾	2	3*	-1¼
17	5	5	4	6½	1	3*	+1½
18	8	6¼	8	6¾	2	1*	-1¾

* Starred figures designate the erroneous estimates by the majority.

The quantitative results are clear and unambiguous.

1. There was a marked movement toward the majority. One-third of all the estimates in the critical group were errors identical with or in the direction of the distorted estimates of the majority. The significance of this finding becomes clear in the light of the virtual absence of errors in control groups the members of which recorded their estimates in writing. The relevant data of the critical and control groups are summarized in Table 2.

TABLE 2
Distribution of Errors in Experimental and Control Groups

Number of Critical Errors	Critical Group* (N=50)	Control Group (N=37)
	F	F
0	13	35
1	4	1
2	5	1
3	6	
4	3	
5	4	
6	1	
7	2	
8	5	
9	3	
10	3	
11	1	
12	0	
Total	50	37
Mean	3.84	0.08

* All errors in the critical group were in the direction of the majority estimates.

2. At the same time the effect of the majority was far from complete. The preponderance of estimates in the critical group (68 per cent) was correct despite the pressure of the majority.

3. We found evidence of extreme individual differences. There were in the critical group subjects who remained independent without exception, and there were those who went nearly all the time with the majority. (The maximum possible number of errors was 12, while the actual range of errors was 0-11.) One-fourth of the critical subjects

was completely independent; at the other extreme, one-third of the group displaced the estimates toward the majority in one-half or more of the trials.

The differences between the critical subjects in their reactions to the given conditions were equally striking. There were subjects who remained completely confident throughout. At the other extreme were those who became disoriented, doubt-ridden, and experienced a powerful impulse not to appear different from the majority.

For purposes of illustration we include a brief description of one independent and one yielding subject.

Independent. After a few trials he appeared puzzled, hesitant. He announced all disagreeing answers in the form of "Three, sir; two, sir", not so with the unanimous answers. At trial 4 he answered immediately after the first member of the group, shook his head, blinked, and whispered to his neighbor: "Can't help it, that's one." His later answers came in a whispered voice, accompanied by a depressing smile. At one point he grinned embarrassedly, and whispered explosively to his neighbor: "I always disagree—damn it!" During the questioning, this subject's constant refrain was: "I called them as I saw them, sir." He insisted that his estimates were right without, however, committing himself as to whether the others were wrong, remarking that "that's the way I see them and that's the way they see them." If he had to make a practical decision under similar circumstances, he declared, "I would follow my own view, though part of my reason would tell me that I might be wrong." Immediately following the experiment the majority engaged this subject in a brief discussion. When they pressed him to say whether the entire group was wrong and he alone right, he turned upon them defiantly, exclaiming: "You're probably right, but you may be wrong!" To the disclosure of the experiment this subject reacted with the statement that he felt "exultant and relieved," adding, "I do not deny that at times I had the feeling: 'to heck with it, I'll go along with the rest.'"

Yielding. This subject went with the majority in 11 out of 12 trials. He appeared nervous and somewhat confused, but he did not attempt to evade discussion; on the contrary, he was helpful and tried to answer to the best of his ability. He opened the discussion with the statement: "If I'd been the first I probably would have responded differently"; this was his way of stating that he had adopted the majority estimates. The primary factor in his case was loss of confidence. He perceived the majority as a decided group, acting without hesitation: "If they had been doubtful I probably would have changed, but they

answered with such confidence." Certain of his errors, he explained, were due to the doubtful nature of the comparisons; in such instances he went with the majority. When the object of the experiment was explained, the subject volunteered: "I suspected about the middle—but tried to push it out of my mind." It is of interest that his suspicion was not able to restore his confidence and diminish the power of the majority. Equally striking is his report that he assumed the experiment to involve an "illusion" to which the others, but not he, were subject. This assumption too did not help to free him; on the contrary, he acted as if his divergence from the majority was a sign of defect. The principal impression this subject produced was of one so caught up by immediate difficulties that he lost clear reasons for his actions, and could make no reasonable decisions.

A FIRST ANALYSIS OF INDIVIDUAL DIFFERENCES

On the basis of the interview data described earlier, we undertook to differentiate and describe the major forms of reaction to the experimental situation, which we shall now briefly summarize.

Among the *independent* subjects we distinguished the following main categories:

- (1) Independence based on *confidence* in one's perception and experience. The most striking characteristic of these subjects is the vigor with which they withstand the group opposition. Though they are sensitive to the group, and experience the conflict, they show a resilience in coping with it, which is expressed in their continuing reliance on their perception and the effectiveness with which they shake off the oppressive group opposition.
- (2) Quite different are those subjects who are independent and *withdrawn*. These do not react in a spontaneously emotional way, but rather on the basis of explicit principles concerning the necessity of being an individual.
- (3) A third group of independent subjects manifest considerable tension and *doubt*, but adhere to their judgments on the basis of a felt necessity to deal adequately with the task.

The following were the main categories of reaction among the *yielding* subjects, or those who went with the majority during one-half or more of the trials.

- (1) *Distortion of perception* under the stress of group pressure. In this category belong a very few subjects who yield completely, but are not aware that their estimates have been displaced or distorted by the

majority. These subjects report that they came to perceive the majority estimates as correct.

(2) *Distortion of judgment.* Most submitting subjects belong to this category. The factor of greatest importance in this group is a decision the subjects reach that their perceptions are inaccurate, and that those of the majority are correct. These subjects suffer from primary doubt and lack of confidence; on this basis they feel a strong tendency to join the majority.

(3) *Distortion of action.* The subjects in this group do not suffer a modification of perception nor do they conclude that they are wrong. They yield because of an overmastering need not to appear different from or inferior to others, because of an inability to tolerate the appearance of defectiveness in the eyes of the group. These subjects suppress their observations and voice the majority position with awareness of what they are doing.

The results are sufficient to establish that independence and yielding are not psychologically homogeneous, that submission to group pressure (and freedom from pressure) can be the result of different psychological conditions. It should also be noted that the categories described above, being based exclusively on the subjects' reactions to the experimental conditions, are descriptive, not presuming to explain why a given individual responded in one way rather than another. The further exploration of the basis for the individual differences is a separate task upon which we are now at work.

EXPERIMENTAL VARIATIONS

The results described are clearly a joint function of two broadly different sets of conditions. They are determined first by the specific external conditions, by the particular character of the relation between social evidence and one's own experience. Second, the presence of pronounced individual differences points to the important role of personal factors, of factors connected with the individual's character structure. We reasoned that there are group conditions which would produce independence in all subjects, and that there probably are group conditions which would induce intensified yielding in many, though not in all. Accordingly we followed the procedure of *experimental variation*, systematically altering the quality of social evidence by means of systematic variation of group conditions. Secondly, we deemed it reasonable to assume that behavior under the experimental social pressure is significantly related to certain

basic, relatively permanent characteristics of the individual. The investigation has moved in both of these directions. Because the study of the character-qualities which may be functionally connected with independence and yielding is still in progress, we shall limit the present account to a sketch of the representative experimental variations.

THE EFFECT OF NONUNANIMOUS MAJORITIES

Evidence obtained from the basic experiment suggested that the condition of being exposed *alone* to the opposition of a "compact majority" may have played a decisive role in determining the course and strength of the effects observed. Accordingly we undertook to investigate in a series of successive variations the effects of *nonunanimous* majorities. The technical problem of altering the uniformity of a majority is, in terms of our procedure, relatively simple. In most instances we merely directed one or more members of the instructed group to deviate from the majority in prescribed ways. It is obvious that we cannot hope to compare the performance of the same individual in two situations on the assumption that they remain independent of one another. At best we can investigate the effect of an earlier upon a later experimental condition. The comparison of different experimental situations therefore requires the use of different but comparable groups of critical subjects. This is the procedure we have followed. In the variations to be described we have maintained the conditions of the basic experiment (*e.g.*, the sex of the subjects, the size of the majority, the content of the task, and so on) save for the specific factor that was varied. The following were some of the variations we studied:

1. *The presence of a "true partner."* (a) In the midst of the majority were *two* naive, critical subjects. The subjects were separated spatially, being seated in the fourth and eighth positions, respectively. Each therefore heard his judgment confirmed by one other person (provided the other person remained independent), one prior to, the other subsequently to announcing his own judgment. In addition, each experienced a break in the unanimity of the majority. There were six pairs of critical subjects. (b) In a further variation the "partner" to the critical subject was a member of the group who had been instructed to respond correctly throughout. This procedure permits the exact control of the partner's responses. The partner was always seated in the fourth position; he therefore announced his estimates in each case before the critical subject.

The results clearly demonstrate that a disturbance of the una-

minority of the majority markedly increased the independence of the critical subjects. The frequency of pro-majority errors dropped to 10.4 per cent of the total number of estimates in variation (a), and to 5.5 per cent in variation (b). These results are to be compared with the frequency of yielding to the unanimous majorities in the basic experiment, which was 32 per cent of the total number of estimates. It is clear that the presence in the field of *one other* individual who responded correctly was sufficient to deplete the power of the majority, and in some cases to destroy it. This finding is all the more striking in the light of other variations which demonstrate the effect of even small minorities provided they are unanimous. Indeed, we have been able to show that a unanimous majority of three is, under the given conditions, far more effective than a majority of eight containing one dissenter. That critical subjects will under these conditions free themselves of a majority of seven and join forces with one other person in the minority is, we believe, a result significant for theory. It points to a fundamental psychological difference between the condition of being alone and having a minimum of human support. It further demonstrates that the effects obtained are not the result of a summation of influences proceeding from each member of the group; it is necessary to conceive the results as being relationally determined.

2. *Withdrawal of a "true partner."* What will be the effect of providing the critical subject with a partner who responds correctly and then withdrawing him? The critical subject started with a partner who responded correctly. The partner was a member of the majority who had been instructed to respond correctly and to "desert" to the majority in the middle of the experiment. This procedure permits the observation of the same subject in the course of transition from one condition to another. The withdrawal of the partner produced a powerful and unexpected result. We had assumed that the critical subject, having gone through the experience of opposing the majority with a minimum of support, would maintain his independence when alone. Contrary to this expectation, we found that the experience of having had and then lost a partner restored the majority effect to its full force, the proportion of errors rising to 28.5 per cent of all judgments, in contrast to the preceding level of 5.5 per cent. Further experimentation is needed to establish whether the critical subjects were responding to the sheer fact of being alone, or to the fact that the partner abandoned them.

3. *Late arrival of a "true partner."* The critical subject started as a minority of one in the midst of a unanimous majority. Toward the

conclusion of the experiment one member of the majority "broke" away and began announcing correct estimates. This procedure, which reverses the order of conditions of the preceding experiment, permits the observation of the transition from being alone to being a member of a pair against a majority. It is obvious that those critical subjects who were independent when alone would continue to be so when joined by another partner. The variation is therefore of significance primarily for those subjects who yielded during the first phase of the experiment. The appearance of the late partner exerts a freeing effect, reducing the level to 8.7 per cent. Those who had previously yielded also became markedly more independent, but not completely so, continuing to yield more than previously independent subjects. The reports of the subjects do not cast much light on the factors responsible for the result. It is our impression that having once committed himself to yielding, the individual finds it difficult and painful to change his direction. To do so is tantamount to a public admission that he has not acted rightly. He therefore follows the precarious course he has already chosen in order to maintain an outward semblance of consistency and conviction.

4. *The presence of a "compromise partner."* The majority was consistently extremist, always matching the standard with the most unequal line. One instructed subject (who, as in the other variations, preceded the critical subject) also responded incorrectly, but his estimates were always intermediate between the truth and the majority position. The critical subject therefore faced an extremist majority whose unanimity was broken by one more moderately erring person. Under these conditions the frequency of errors was reduced but not significantly. However, the lack of unanimity determined in a strikingly consistent way the *direction* of the errors. The preponderance of the errors, 75.7 per cent of the total, was moderate, whereas in a parallel experiment in which the majority was unanimously extremist (*i.e.*, with the "compromise" partner excluded), the incidence of moderate errors was reduced to 42 per cent of the total. As might be expected, in a unanimously moderate majority, the errors of the critical subjects were without exception moderate.

THE ROLE OF MAJORITY SIZE

To gain further understanding of the majority effect, we varied the size of the majority in several different variations. The majorities, which were in each case unanimous, consisted of 16, 8, 4, 3, and 2 persons, respectively. In addition, we studied the limiting case in which

the critical subject was opposed by one instructed subject. Table III contains the means and the range of errors under each condition.

TABLE 3

Errors of Critical Subjects with Unanimous Majorities of Different Size

Size of majority	Control	1	2	3	4	8	16
N	37	10	15	10	10	50	12
Mean number of errors	0.08	0.33	1.53	4.0	4.20	3.84	3.75
Range of errors	0-2	0-1	0-5	1-12	0-11	0-11	0-10

With the opposition reduced to one, the majority effect all but disappeared. When the opposition proceeded from a group of two, it produced a measurable though small distortion, the errors being 12.8 per cent of the total number of estimates. The effect appeared in full force with a majority of three. Larger majorities of four, eight, and sixteen did not produce effects greater than a majority of three.

The effect of a majority is often silent, revealing little of its operation to the subject, and often hiding it from the experimenter. To examine the range of effects it is capable of inducing, decisive variations of conditions are necessary. An indication of one effect is furnished by the following variation in which the conditions of the basic experiment were simply reversed. Here the majority, consisting of a group of sixteen, was naive; in the midst of it we placed a single individual who responded wrongly according to instructions. Under these conditions the members of the naive majority reacted to the lone dissenter with amusement and disdain. Contagious laughter spread through the group at the droll minority of one. Of significance is the fact that the members lack awareness that they draw their strength from the majority, and that their reactions would change radically if they faced the dissenter individually. In fact, the attitude of derision in the majority turns to seriousness and increased respect as soon as the minority is increased to three. These observations demonstrate the role of social support as a source of power and stability, in contrast to the preceding investigations which stressed the effects of withdrawal of social support, or to be more exact, the effects of social opposition. Both aspects must be explicitly considered in a unified formulation of the effects of group conditions on the formation and change of judgments.

THE ROLE OF THE STIMULUS-SITUATION

It is obviously not possible to divorce the quality and course of the

group forces which act upon the individual from the specific stimulus-conditions. Of necessity the structure of the situation moulds the group forces and determines their direction as well as their strength. Indeed, this was the reason that we took pains in the investigations described above to center the issue between the individual and the group around an elementary and fundamental matter of fact. And there can be no doubt that the resulting reactions were directly a function of the contradiction between the objectively grasped relations and the majority position.

These general considerations are sufficient to establish the need of varying the stimulus-conditions and of observing their effect on the resulting group forces. We are at present conducting a series of investigations in which certain aspects of the stimulus-situation are systematically altered.

One of the dimensions we are examining is the magnitude of discrepancies above the threshold. Our technique permits an easy variation of this factor, since we can increase or decrease at will the deviation of the majority from the given objective conditions. Hitherto we have studied the effect of a relatively moderate range of discrepancies. Within the limits of our procedure we find that different magnitudes of discrepancy produce approximately the same amount of yielding. However, the quality of yielding alters: as the majority becomes more extreme, there occurs a significant increase in the frequency of "compromise" errors. Further experiments are planned in which the discrepancies in question will be extremely large and small.

We have also varied systematically the structural clarity of the task, including in separate variations judgments based on mental standards. In agreement with other investigators, we find that the majority effect grows stronger as the situation diminishes in clarity. Concurrently, however, the disturbance of the subjects and the conflict-quality of the situation decrease markedly. We consider it of significance that the majority achieves its most pronounced effect when it acts most painlessly.

SUMMARY

We have investigated the effects upon individuals of majority opinions when the latter were seen to be in a direction contrary to fact. By means of a simple technique we produced a radical divergence between a majority and a minority, and observed the ways in which individuals coped with the resulting difficulty. Despite the stress of the given conditions, a substantial proportion of individuals retained

their independence throughout. At the same time a substantial minority yielded, modifying their judgments in accordance with the majority. Independence and yielding are a joint function of the following major factors: (1) The character of the stimulus situation. Variations in structural clarity have a decisive effect: with diminishing clarity of the stimulus-conditions the majority effect increases. (2) The character of the group forces. Individuals are highly sensitive to the structural qualities of group opposition. In particular, we demonstrated the great importance of the factor of unanimity. Also, the majority effect is a function of the size of group opposition. (3) The character of the individual. There were wide, and indeed, striking differences among individuals within the same experimental situation. The hypothesis was proposed that these are functionally dependent on relatively enduring character differences, in particular those pertaining to the person's social relations.

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MEASURING MOTIVATION IN PHANTASY:

THE ACHIEVEMENT MOTIVE

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CONTEMPORARY PSYCHOLOGICAL THEORY stresses the importance of motivation, but provides no satisfactory method for measuring it, at least at the human level. The present research was begun with the idea of remedying this defect. Psychology needs a measure of human motivation and we set out to find one. This report represents a brief description of some of the main findings obtained by our entire research group which has included the following people: David Angell, John W. Atkinson, Robert C. Birney, Russell A. Clark, Gerald A. Friedman, Jules Holzbarg, Alvin M. Liberman, Edgar L. Lowell, John Perkins, Thornton B. Roby, Benjamin Simon, Joseph Veroff, and Josef Zatzkis.

In retrospect, at least, our search appears to have been guided by three hypotheses. First, the method of measurement for maximum theoretical usefulness should be at least partially independent of the methods of measurement used to define the other two variables in contemporary psychological theory, namely, perception and learning. The field of sensation and perception received a great boost when the psychophysical methods were invented or systematized and put into wide use over a century ago. Theoretical development in this field continues to draw heavily for its vitality on the application of these methods. Similarly, learning theory received a great boost around the beginning of the twentieth century when methods for studying problem-solving behavior (e.g., conditioning,