

Temporal pattern of social information and self-attribution of ability¹

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Attribution theory (e.g., Kelley, 1967, 1975) provides a useful heuristic framework for exploring conditions which influence a person's sense of ability in a variety of different endeavors. For instance, it can be assumed that an individual will gain a feeling of ability on a novel judgment task if he experiences both difficulty and success in dealing with the task. Kelley (1975) has suggested that individuals make attributions of task difficulty and success on the basis of two main types of information when absolute standards about these experiences are lacking: (1) *social information*—where agreement by a majority of others on a task judgment indicates that one's judgment is correct, but where disagreement by a majority indicates incorrectness; (2) *personal information*—where an individual's perceived consistency in task judgments over time and through different modes of interaction indicates that his judgment is correct, but where inconsistency indicates incorrectness.

There is a conflict between the data indicative of correctness and those indicative of difficulty. If the person's solution to a problem is the same as that of others, he can infer that the solution was correct but also that the problem was not that difficult. Similarly, consistent answers may indicate correctness, but no feeling of difficulty will be derived. As Kelley (1975) has sug-

1. This research was supported by funds provided by grants from the Vanderbilt Research Council and NIMH (MH25736) to the first author and by funds provided by The Ohio State University Fellowship Program to the second author. Part of this research was conducted while the first author held a visiting professorship at The Ohio State University. The authors wish to extend their appreciation to Harold Kelley for contributing many ideas in the formulation of this research, Yvette Harvey for help in preparation of stimulus materials, and Stephen Amramowitz, Timothy Brock, Anthony Greenwald, Stephen Harkins, Richard Petty, and Gary Wells for helpful advice during the course of this research and preparation of this manuscript.

gested and has been shown in a study by Harvey and Kelley (1974), which related to personal information, the dilemma involved in establishing conditions in which an individual gains feelings of both correctness and difficulty may be surmounted if the individual undergoes a particular temporal sequence of experience with the task—a sequence in which both of these experiences are created for the individual. Presumably, the sequence which would convey the greatest sense of competence would be one in which the individual perceived difficulty initially on the task but then later gained a feeling of success (as if he had mastered the task).

In two studies, Harvey and Kelley (1974) presented to subjects successive, brief presentations of either visual or auditory stimuli commonly used in psychophysical research. Through subtle variations in the stimulus on its successive presentations, they were able partially to control a subject's successive reactions to it. Specifically, over a series of trials, subjects were presented with various temporal patterns of stimuli designed to create variations in response consistency-inconsistency. Harvey and Kelley hypothesized that in his interaction with a judgmental task, a person who first experiences inconsistency (i.e., when stimulus discriminations are extremely difficult to make) but then experiences consistency (i.e., when stimulus discriminations are easy to make) would judge his competence on the task to be higher than persons experiencing continuous consistency. The results of the research provided strong evidence for this hypothesis in settings involving both visual and auditory stimuli.

The present research was designed to investigate how self-attributed ability might be affected by sequence of feedback about others' presumed responses on a task which involved simulated judgments for a series of abstracted civil judicial cases. Sequences were created so that an individual received one of the following five temporal sequences of information about his judgments in the context of the total set of judgments by all individuals: being in the minority for the first part of the sequence followed by change to a majority position, continuously being in the minority throughout the sequence, being in the majority at first but then changing to a minority position, continuously being in the majority throughout the sequence, back

and forth alternation between a majority and a minority position. Subjects received feedback about others' responses but no interaction was possible over the series of decisions. Further, the situation was arranged so that subjects clearly knew that they could not be influencing the judgments of others who were alleged to be present.

In addition to the work by Harvey and Kelley (1974), there has been some other research which is tangentially relevant to the present work. Temporal sequence of personally relevant information has been shown to have important effects upon interpersonal attraction (Aronson & Linder, 1965). Also, and more germane to the present research, there is some evidence on how certain temporal patterns of success-failure on individual tasks affect the attribution of intelligence (Jones, Rock, Shaver, Goethals, & Ward, 1968). In a number of experiments, these investigators found that observers judged a stimulus person to be more intelligent if he had solved a preponderance of IQ-type problems at the beginning of a series than if he had solved an equal number near the end. Jones et al. also found that subjects' judgments of their own ability were unaffected by pattern of performance, although an ascending pattern of success yielded higher predictions of future success on the task than did a descending pattern. There has been little if any previous work on how patterns of transition between majority-minority positions may influence an individual's own perceived ability on a task.

In this research, we assumed that an individual would attain a sense of being successful on a decisional problem when his judgment placed him in the majority on the problem. Extending the reasoning advanced by Harvey and Kelley (1974) and Kelley (1975), we hypothesized that the minority-to-majority sequence would produce greater self-attributed ability than would the sequence where an individual was continuously in the majority. Individuals in a minority-to-majority sequence should feel a heightened sense of mastery on the task because movement into a majority position was not readily forthcoming—indicating initial difficulty—but then did occur, implying that they had been successful in overcoming the difficult task. On the other hand, it was assumed that individuals who were continuously in the majority would perceive the judgments to be relatively easy and would gain no strong sense of mastery.

No firm a priori hypothesis was made about whether a majority-to-minority sequence or a continuous minority sequence would produce a greater sense of ability. It may be assumed that a pattern of judgments characterized by transition from majority-to-minority would be especially demoralizing to a person's sense of ability on the task. Thus, one possibility was that the majority-to-minority sequence would produce a sense of less ability as compared to the continuous minority sequence. On the other hand, an individual who experiences a majority-to-minority sequence may perceive that his interest flagged during the minority component of his sequence; and, in any case, he may have "stored up" a sense of ability which is not completely diminished by the minority component. In contrast, the individual who experiences the continuous minority sequence may never have had an opportunity to gain any sense of ability on the task. In this case, the majority-to-minority sequence would produce a greater sense of ability than would the continuous minority sequence.

We expected that the alternation sequence would produce a rather modest level of self-attributed ability relevant to the other sequences. This sequence was included in the design mainly to test whether simple variability in feedback, as opposed to systematically patterned sequences, would produce the type of effects anticipated for the minority-to-majority or the majority-to-minority sequences.

Finally, the present research has relevance for Nisbett and Borgida's (1975) and Nisbett, Borgida, Crandall, and Reed's (1977) recent work which suggests that people are relatively insensitive to consensus information in making attributions about self and others. Nisbett and his colleagues argue that this insensitivity to consensus information occurs because almost by its very nature, such information is abstract, pallid, and remote. However, despite these qualities which might be inherent in consensus information, there also is evidence that, at least on some occasions, people do employ this type of information in making attributions, especially in combination with other types of information (e.g., Orvis, Cunningham, & Kelley, 1975; Wells & Harvey, in press); further, McArthur (1976) has shown that consensus information is relatively potent when it pertains to persons rather than things. The present research examined the role of multiple inputs of consensus (being in the majority) and

disconsensus (being in the minority) information in affecting inferences about one's own ability.

METHOD

Subjects

Subjects were 55 male and female students participating in order to earn credit in their general psychology course at the Ohio State University. The sex ratio was approximately constant across conditions. There were 11 subjects, randomly assigned, in each condition.

Procedure

At the beginning of each session, the subject and another presumed subject of the same sex were greeted by the experimenter at a designated place. The experimenter explained that the study was concerned with jury simulation and in particular with how background factors influence voting behavior and psychological experience. The experimenter explained that three other members of their jury panel already had arrived and had been seated in individual rooms (he explained that jurors were being assigned to individual rooms to control for the influence of extraneous factors on their behavior). He then directed the subject to be seated in a room and the other person to be seated in a nearby room. In all conditions, the room in which the subject was seated bore a sign reading "Juror #1 (Foreman)." Inside the room was a small blackboard on which was drawn a matrix with juror numbers 1 through 5 and case numbers 1 through 12.

The subject was given general instructions which described the study as a joint venture by the psychology department and law school to explore judicial decision-making processes and accompanying psychological experience; subjects initially were asked to fill out short autobiographical forms which presumably were related to the objective of investigating background factors in voting behavior. The subject also was given specific instructions pertaining to the role of jury foreman. The instructions indicated that in each jury panel to be run, one person would be randomly assigned the role of tallying the votes of the other jurors. The subject was cautioned to be very careful in recording votes since only he/she was keeping a record of the votes. It was explained that the "research coordinator" (i.e., the experimenter) would circulate among the jurors' rooms, answering questions and collecting votes. The jurors were to proceed one case at a time and were given a 5-minute time limit for each case. After the subject understood the instructions, the experimenter gave him/her the first case. The experimenter explained that he would return

in a little less than 5 minutes with the votes of the other jurors for the subject to record on the blackboard. It was emphasized that no juror would be able to learn about how another juror voted before he/she voted. The procedure involving the experimenter's bringing the votes on specially prepared forms to the subject was repeated for each of the 12 cases; a judgment for each case could be made by marking either a yes or a no on the voting form.

A particular pattern of feedback was fashioned for the subject through the experimenter's ability, via a slightly ajar door, to surreptitiously observe the subject record his/her own vote (which he/she had been directed to do just as soon as a decision had been made) on the blackboard.

The abstracted cases were developed after examination of real civil court cases. However, the cases were adapted to accommodate the objectives of the study. They were fairly detailed (taking up $\frac{1}{2}$ to $\frac{3}{4}$ of a page), with arguments presented for both plaintiff and defendant. Most of the cases dealt with relations among sellers or purveyors of some service and consumers or clients. As an example of the cases selected, a sample case is presented below.

For a \$75 deposit, residents of the Briarcliff Apartments are allowed to keep pets. Lisa and Jenny paid the deposit and brought in a German shepherd puppy. For the first 3 weeks the puppy was very destructive. He tore up portions of the carpet and chewed on the floorboards. It appeared, however, that in the following month he had settled down. When fixing a leaking faucet, the maintenance men noticed all the damage and told the apartment manager. The manager inspected the damage, which was over \$75 worth, and asked the girls to get rid of the dog. They said the dog was now well-behaved. They couldn't afford to fix the place up just then, but said they would before they moved. They felt that with these assurances they should be able to keep the dog. Fearing further damage and lack of fulfillment of the assurances, the manager refused their request. Was his decision right?

The set of cases was selected after pilot study subjects had rated a large number of cases as to whether one or the other contestant clearly should be awarded the verdict and the extent to which the cases were similar in number of facts presented and amount of interest appeal the cases held. This procedure was carried out to ensure that the facts of each case used did not necessarily dictate a judgment in favor of one or the other of the contestants and that the cases chosen were roughly comparable in terms of the number and com-

plexity of facts presented and interest value. Also, pilot work was done to determine how many judgments would be necessary (given the nature of the cases) in order for subjects to indicate that they perceived both distinctive patterns and definite transition between agreement and disagreement segments. It was found that approximately 12 such judgments would be sufficient to meet these criteria without causing too much mental fatigue.

In all, there were five conditions—the first four of which comprised a 2×2 design (First Half Majority or Minority Position \times Second Half Majority or Minority Position). For subjects in the continuous majority condition, 75 percent of the 4 other respondents agreed with the subject on each of the 12 cases. For subjects in the continuous minority condition, 75 percent of the 4 other respondents disagreed with the subject on each of the 12 cases. (It should be noted that 75 percent was used in these conditions instead of 100 percent in order to reduce subjects' suspicion about the veridicality of the patterns and, also, the theoretical ideas behind this work did not call for segments involving complete consensus on the part of others.) The disagreeing or agreeing member of the group was randomly selected for each case with the stipulation that no group member disagree or agree on consecutive problems.

For subjects in the minority-to-majority conditions, 75 percent of the group members disagreed with the subject on each of the first 6 cases, but 75 percent of the group members agreed with the subject on each of the last 6 cases. For subjects in the majority-to-minority conditions, 75 percent of the group agreed with the subject on each of the first 6 cases, but 75 percent of the group disagreed with the subject on each of the last 6 cases. The randomization for these conditions involved the stipulation that no one group member represent the agreeing or disagreeing 25 percent on consecutive cases.

In the alternation condition, which was not included in the factorial design, the subjects received an alternating pattern of agreement and disagreement. Alternation occurred either after every case or after a run of two cases; alternation was not necessarily implemented after every case because it was felt that such a procedure would be more likely to make subjects suspicious about the authenticity of the pattern. The particular alternation pattern was randomly determined for each subject, with the stipulation that each subject in this condition receive overall equal amounts of agreement and disagreement.

After each case, the subject was asked to answer one question which was designed to assess his/her perception of the difficulty of that case. This question was answered on a 7-point scale (with 0 =

not very difficult and 6 = very difficult). At the end of the 12 cases, the experimenter returned to the subject's room and asked him/her to examine the blackboard briefly to make sure that votes had been recorded for each juror for all 12 cases. This procedural step was employed to increase the salience of the subject's particular pattern for him/her. The subject was then asked questions designed to probe his/her present feelings of ability on the task and prediction about future ability on similar tasks. These questions were answered on 7-point scales (with 0 = not very much ability at all and 6 = very much ability).

The session was terminated for each subject after he/she had been questioned for suspicion about the alleged purpose of the study or about the existence of the other persons or the legitimacy of their responses. None of the subjects indicated suspicion.²

RESULTS

Post-Case Ratings of Ability

It was expected that the minority-to-majority sequence would produce greater feelings of ability than would the continuous majority sequence. Table 1, which presents the means for the ability measures, shows that the data for both present feelings of ability and predictions of future ability are in line with this expectation. This table also shows that ability ratings show a pattern in which the continuous majority sequence is higher than the majority-to-minority sequence, which is higher than the continuous minority sequence. Individual analyses of variance for these two measures for the four conditions comprising the factorial design revealed the following significant effects: main effects for the second half variable (present feelings, $F(1,40) = 19.39, p < .001$; predictions, $F(1,40) = 8.14, p < .007$), and interactions between the first half variable and the second half variable (present feelings, $F(1,40) = 6.14, p < .02$; predictions, $F(1,40) = 5.33, p < .03$). There were no other significant effects for these measures. The main effects for the second half variable reflect the higher feelings or predictions of ability for individuals in the majority during the second part of the task than for those in the minority.

2. The data for two subjects were not included in the final analyses (or among the 55 total subjects previously mentioned). One of these two subjects (in the majority-to-minority sequence) refused to vote on some of the cases, and the other subject (in the continuous minority sequence) changed his vote twice after receiving votes from other jurors.

Table 1. Means for the ratings of ability.

Measures	First half variable (1st 6 cases)		Majority		Minority	
	Present feelings of ability	Predictions of future ability	Present feelings of ability	Predictions of future ability	Present feelings of ability	Predictions of future ability
Second half variable (2nd 6 cases)						
Minority	2.63	3.34	3.36	3.90	3.36	3.90
Majority	4.93	5.19	3.96	4.09	3.96	4.09

Note.—The higher the number, the greater the ratings of ability; 11 subjects per cell. The means for the alternation condition were 3.07 for present feelings of ability and 3.36 for predictions of future ability.

Individual comparisons relevant to the significant interactions for the ability measures revealed that the means for the minority-to-majority sequence were greater than the means for the continuous majority sequence, $p < .01$ for both measures. These comparisons also showed that the means for the minority-to-majority agreement sequence were greater than the means for the continuous minority sequence, $p < .001$ for both measures. Individual comparisons within the factorial design did not reveal any other significant effects. These data provide support for the expected relationship between the minority-to-majority sequence and the continuous majority sequence for both present feelings of ability and predictions of future ability.

The alternation sequence (the means for which are given in the note for Table 1) produced a relatively low level of perceived ability. Individual comparisons for the two perceived ability measures showed that the means for this sequence were significantly lower than the means for the minority-to-majority sequence, $p < .001$ for both measures; also, on the present feelings measure, the mean for the alternation sequence was lower than the mean for the continuous majority sequence, $p < .02$. These results indicate that simple alternation in majority-minority position is not conducive to relatively high ability ratings.

Per-Case Ratings of Difficulty

Table 2 presents the mean per-case ratings of perceived difficulty; these are overall means for each 6-case segment. Subjects in the minority-to-majority sequence showed increasingly lower

Table 2. Per-case perceived difficulty means for each segment.

Segment	Conditions			Attraction	
	Continuous majority	Minority-to-majority	Continuous minority		Majority-to-minority
First half (1st 6 cases)	2.42	3.46	3.35	2.51	3.45
Second half (2nd 6 cases)	2.10	2.13	3.83	3.92	3.38

Note.—The higher the number, the greater the perceived difficulty.

ratings from the first half to the second half. A generally opposite trend was shown for subjects in the majority-to-minority sequence. Subjects in the continuous majority sequence showed a pattern of relatively low ratings which became even lower as the task continued, and subjects in the continuous minority sequence showed a reverse trend—generally high and becoming higher as the task continued. Subjects in the alternation sequence showed a relatively high and flat trend in their ratings.

As was expected from the rationale for the temporal pattern hypothesis, two-tailed *t*-tests revealed that subjects in the minority-to-majority sequence tended to perceive the task as more difficult for the first half than did subjects in the continuous majority sequence, $p < .06$; no significant differences existed between these sequences for the second half. Also, subjects in the minority-to-majority sequence perceived the task to be more difficult for the first half than for the second half, $p < .04$. There was no significant difference between halves for subjects in the continuous majority sequence. These data provide evidence about the presumed role of perceived difficulty in the development of feelings of ability on the judgmental task.

Two Simulation Studies

Before discussing the results of the main experiment, we will describe briefly two simulation studies which were done to answer further questions raised in this research. In the first of these studies, we explored the ability ratings of subjects who were asked to imagine having gone through the procedure in the main study and then having received one of the final majority-minority patterns in the factorial design (the alternation pattern was not included). Would these subjects exhibit

ability ratings which mirrored those of the subjects in the main experiment? In a within-subjects design, 16 subjects received information about the actual experiment and were asked to imagine that they had been in the study and to give perceived ability ratings (for both the present feelings and predictions of future ability measures) for each of the four displays. There were four different orders in which the patterns were presented to subjects, and each order was presented to 4 subjects.

The only significant effects in this simulation study were main effects ($p < .001$) for both the first half and second half variables for both measures of perceived ability. For both independent variables, these main effects showed higher ratings of ability for majority than for minority segments. Thus, the data did not replicate the theoretically interesting interaction pattern found in the main experiment. Apparently, simply thinking about the sequences and seeing the final patterns is not enough to produce the pattern of perceived ability found in the main study.

The results of the second simulation study seem to accommodate rather well the foregoing conclusion. In this study, 26 subjects were given information about the main experiment and the final displays for the four majority-minority sequences. Subsequently, they were asked to indicate which one of the patterns would confer the highest feeling of ability. Eighty-eight percent (23) indicated that they thought the continuous majority sequence would lead to the highest feeling of ability. Only 1 subject felt the minority-to-majority sequence would lead to the highest feeling of ability and 2 subjects felt the majority-to-minority sequence would produce such a feeling.

Thus, the impact of the minority-to-majority pattern on the perceived ability of individuals who actually are involved in a judgmental task and getting regular feedback about others' responses apparently is not intuitively obvious to people. While our simulation studies do not provide definitive evidence on the matter, they do suggest that a degree of actual participation on a task may be necessary for the efficacious effect of the minority-to-majority sequence. From the evidence at hand, we do not know whether this sequence would have a boosting effect for persons who participated, *did not* receive regular feedback, but then did receive the final displays.

DISCUSSION

The results of the main experiment provide evidence for the hypothesis that the minority-to-majority sequence would produce higher ratings of ability than would the continuous majority sequence. The hypothesis was supported by the data for both the measures of present feelings of ability and predictions of future ability on similar tasks. The results also showed non-significantly higher ability ratings for the majority-to-minority sequence than for the continuous minority sequence, and the alternation sequence produced relatively low ratings of ability.

The rationale behind the temporal pattern hypothesis examined in this work emphasized the individual's attainment of both a feeling of task difficulty and task success or mastery in the minority-to-majority sequence. The per-case ratings of perceived difficulty lend support to the assumption that subjects in this sequence perceived the task to be relatively difficult at first but then to be easier as the movement to a majority position occurred. Also, these perceived difficulty ratings provide evidence for the assumption that subjects in the continuous majority sequence found the task to be relatively easy throughout its course.

We have argued that the high ability ratings in the minority-to-majority sequence were mediated in part by a feeling of success on the task. However, in our experimental situation—where quite clearly no absolutely right or wrong decisions could be rendered—it seems likely that the sense of success conveyed by being in the majority depended upon subjects, at least implicitly, imputing credibility to their presumed colleagues. If a simulated juror discounted his associates' opinions (e.g., especially when he held a minority position), the development of a sense of mastery should not have occurred in the systematic fashion we have proposed, and the obtained temporal pattern effects should not have been found.

There are two possible alternative interpretations that might be entertained to account for the results of the main experiment. A somewhat technical interpretation might be developed based upon considerations of the average amount of agreement received by a subject in a particular sequence. In a majority segment, a total of 80 percent of the individuals in the purported group (including the subject) concurred in their judgments. In a minority segment, a total of 40 percent of the group (including the sub-

ject) show agreement. Could these different percentages when averaged across all trials lead to the results expected from the temporal pattern hypothesis? If the seemingly reasonable assumption is made that a higher average of agreement should contribute more to a sense of ability than a higher average of disagreement, these average percentages could not lead to the expected results. An individual in a continuous majority sequence would be agreed with 80 percent on the average, whereas a person in a minority-to-majority sequence would be agreed with only 60 percent on the average. Thus, the data in the main experiment could not be accounted for in terms of this line of reasoning.

A second and more theoretically relevant possibility is that perceived effort played a mediational role in the development of a sense of ability on the task. Conceivably, subjects in the minority-to-majority sequence may have perceived the task as requiring less expenditure of effort as it progressed since they indicated the task to have been easier from the first to the second segment. In fact, individuals in this sequence may have been motivated by disagreement to try harder at first and then expend less effort as agreement began to occur. And this sense of high to low effort over the course of the task may have contributed to the relatively high ability ratings in this condition.

This reasoning concerning effort as a mediator is congenial with the mastery argument outlined in this paper: people may perceive high ability on a task when they feel that it has become easier for them and, consequently, when they no longer have to exert a great amount of energy to handle the task. However, because of the lack of perceived effort data in the present work, the role of effort as a mediator of the ability ratings should be approached with caution. White (1959) has suggested that because of what he called competence motivation, organisms often seek situations which require a relatively high expenditure of effort in thinking and manipulation of the environment. If ability ratings were directly related to perceived effort, we probably would expect the highest self-attributed ability in the majority-to-minority sequence and/or the continuous minority sequence. But these two sequences yielded relatively low ability ratings. Thus, a sense of great effort expenditure *alone* would not appear to be conducive to high self-attributed ability. While

the present work has provided some evidence and reasoning about how perceived difficulty and mastery contribute to a sense of ability on a task, much more refined investigation will be necessary to provide definitive analysis of how perceived difficulty, effort, mastery, and other relevant experiences are related to self-attributed ability.

The present research extends the work of Harvey and Kelley (1974) on conditions which affect the self-attribution of ability into the social domain. The majority-minority sequence variable studied here does not constitute simply a different operationalization of the consistency-inconsistency variable investigated by Harvey and Kelley. Rather, these are conceptually distinct independent variables presumably reflecting different psychological experiences—one involving feedback from other vis-à-vis one's own behavior and one involving feedback only from one's own behavior. Overall, these studies lend support to Kelley's (1967) statement of the importance of both consistency and consensus in the phenomenology of attribution validity.

Finally, the results of the present research are not consistent with the general implication of Nisbett and Borgida's (1975) and Nisbett et al.'s (1977) research which suggests that people do not readily employ consensus information in making attributions. The present results suggest that people may be quite sensitive to consensus information in making attributions about their own ability on relatively novel tasks when absolute standards are lacking. Furthermore, while it may be true that, as Nisbett and his colleagues have contended, in some situations consensus information is relatively abstract and pallid, there may be other situations such as those in the main experiment (as contrasted with those of the simulation studies) in which consensus information is rather concrete in nature and poignant in its impact on attributions. However, in suggesting the relevance of this research to work on consensus, we should be careful in characterizing the nature of the consensus variable examined here. Essentially, the variable involved not just a single piece of information (e.g., that 16 out of 34 individuals were willing to take very high levels of shock—see Nisbett and Borgida, 1975) but rather a sequence of informational inputs about others' decisions relative to the individual's own decisions. Given the differential results for the various patterns, it seems reasonable

to argue that investigators should give more attention to the effects of multiple, diverse inputs of consensus information on attributions.

SUMMARY

An experiment was conducted to investigate the hypothesis that on a series of judgments by a group, individuals who initially are in the minority but then move to the majority position will attribute greater ability to themselves on the judgmental task than will individuals who continually are in the majority. College students playing the role of simulated jurors made decisions about a series of abstracted civil court cases. Subjects received feedback about the responses of other alleged members of the jury panel throughout the series; the situation did not involve any opportunity to engage in persuasion attempts. Over the course of the series of cases, subjects received one of the following patterns of feedback about others' responses relative to their own: continuously in majority, continuously in minority, from majority to minority, from minority to majority, back and forth alternation between majority and minority. The results showed strong support for the hypothesis and revealed that the lowest perception of ability was held by subjects who continually were in the minority. The data are discussed in terms of the role of an initial feeling of difficulty on a task coupled with an ultimate sense of mastery in conveying a relatively great perception of ability on the task. More generally, the results are related to the literatures concerned with self-attribution of ability and the effects of consensus information on attributions.

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Manuscript received June 1, 1976.