

A BRIEF HISTORY OF THE PROJECT:

GESELLSCHAFTLICHE UND POLITISCHE INDIKATOREN
FÜR UNTERSTÜTZUNG/OPPOSITION, ZUFRIEDENHEIT/
UNZUFRIEDENHEIT UND BEHERRSCHUNG/MACHTLOSIGKEIT

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The Indikatoren project originated in discussions between Wildenmann and Muller at SUNY, Stony Brook during the winter of 1971-72. At that time Wildenmann was attempting to develop an institute at Stony Brook, the Program for European Studies, intended to promote methodologically sophisticated cross-national research in the theory-testing or "nomothetic" mode, as contrasted to the descriptive or "idiographic" mode character of the traditional "area-studies" focus in comparative politics. Muller was interested in the formulation and testing of a general theory to account for individual differences in aggressive political participation. During 1970-71, he had carried out a small-scale survey research project in Waterloo, Iowa, supported by a National Science Foundation dissertation research grant, in which various indicators of concepts relevant to the explanation of aggressive political participation had been explored, certain alternative hypotheses had been tested, and a pro-

visional model of modest predictive accuracy had been developed. Wildenmann encouraged Muller to prepare a proposal for a large-scale survey research project, to be carried out in the Federal Republic of Germany, whose goal would be the testing of a comprehensive general theory of aggressive political participation. This proposal was to be submitted to the Deutsche Forschungsgemeinschaft, under the sponsorship of Wildenmann and his colleague at the University of Mannheim. Professor Wolfgang Hirsch-Weber, with Muller as principal investigator. If funded, it would be carried out under the aegis of the Program for European Studies at SUNY, Stony Brook and the Institut für Sozialwissenschaften at the University of Mannheim.

The model for comparative research that Wildenmann wished to encourage was a combination of theoretical/methodological sophistication and close familiarity with the language and culture of the site where the theory-testing research was to be done - the latter quality, of course, being a necessary condition for valid and reliable operationalization of abstract concepts. To familiarize Muller with the German language and culture, Wildenmann arranged for him to come to the University of Mannheim as Visiting Professor for the summer of 1972; in addition, Muller obtained a Ford Foundation Faculty Research Fellowship that enabled him to remain in Mannheim through the summer of 1973. During this period the research proposal was written, submitted to the DFG,

and funded. Unfortunately, the proposed comparative politics institute at Stony Brook was not supported by SUNY central administration. Hence, all work on the Indikatoren project was carried out in Mannheim.

The project was conceived in three phases:

(1) a Measurement phase, during which a pilot study was to be conducted with the purpose of attempting to determine (a) which of the many different aspects or subdimensions of relevant theoretical concepts were most important for the explanation of aggressive political participation and (b) how one might most usefully operationalize these subdimensions;

(2) a Theory-testing phase, during which (a) a model for the general theory was to be specified, its parameters estimated, and predictive accuracy and diagnostic efficiency determined and then (b) alternative models and single-variable hypotheses were to be taken into account;

(3) a Cross-validation phase, during which (a) the predictive equation emerging from the second phase was to be tested on a subsample of the original subjects, reinterviewed two-years later and (b) the direction of causality vis-a-vis putative independent and dependent variables was to be checked insofar as possible with a nonexperimental research design.

It was felt that these three phases comprised a highly desirable research design because careful attention would be given to the important problems of (1) developing satisfactory empirical indi-

cators of theoretical concepts, (2) comparing alternative explanations of a given phenomenon, and (3) determining the validity of an explanatory model.

Infratest, a survey research firm in Munich - with a reputation for high quality work in the Federal Republic; was selected to carry out the interviewing for the project. The fieldwork was put under the direction of Yola Laupheimer (Director) and Dorothea Reppart (Assistant Director) of the Economics Research Bureau.

THE MEASUREMENT PHASE

Since the aim of the project was to partially replicate, and, in addition, expand and improve upon the Waterloo Project, it was decided to first prepare an English version of the pilot study interview schedule, so as to ensure complete clarity of meaning. At this time Jonathan Pool, a colleague of Muller in the Department of Political Science, SUNY at Stony Brook, was invited to work on the project as a co-investigator, because of his interest in attitude measurement and his complete fluency in the German language. During May, 1973, Muller and Pool prepared the English draft of the pilot study interview schedule. This was then given to Walter Wehrli, the Hilfsassistent for the project, to be translated into German.

When the German translation was ready, Muller, Pool, and Wehrli consulted for some time with personnel from Infratest about this very rough first draft. After these discussions, Infratest prepared the first version of the interview schedule. This version was then discussed in substantial detail with Wildenmann, Dr. Uwe Schleth, Dieter Roth, and Uli Widmaier of the University of Mannheim. The consensus was that a thorough revision needed to be undertaken. This first version of the pilot study interview schedule was much too long and many of the questions were clumsily formulated.

Since it was felt that first priority should be given to inclusion of as many subdimensions of theoretical concepts as possible, the interview schedule was shortened mainly by excluding questions that represented alternative ways of operationalizing the same subdimension. Nevertheless, sufficient alternative operationalizations of given subdimensions were retained so as not to eliminate this measurement question from the pilot study. The majority of the remaining questions were then reformulated so as to improve their clarity and intelligibility for the common man. By the end of July, an extensively revised second draft was ready. Another consultation was held with Infratest. Some minor further revisions were made and a few more questions were deleted in the interest of brevity. Infratest then prepared the second version of the pilot study interview schedule.

From May through July, Muller and Pool were also working on the development of a new measuring instrument called the Meinungsmeter. (A detailed description of this instrument is attached under Appendix A.) Eugen Maus, a graduate student in psychology at the University of Mannheim, was employed to implement the designs for the instrument worked out by Muller and Pool.

The most important measurement-related improvements hoped for were: (1) that the instrument would facilitate the development of better interval-level scales than had heretofore been

possible in survey research; (2) that it would improve the reliability of responses to batteries of items because it would enable respondents, after recording the intensity of their opinion on a series of items synoptically, to have an opportunity to revise, if necessary, any of their responses to particular items after considering the full series. Three mechanical versions of the instrument were built. The first, a single prototype, was constructed of wood and metal. It turned out to be far too unwieldy and heavy for use by interviewers. The second version, of which a small number were built and used in 15 pretests of the interview schedule, was constructed of wood and thin plexiglass. It was lighter and interviewers found it generally satisfactory. The final version, also made of wood and plexiglass, contained a number of minor improvements suggested on the basis of the pretest results; 18 copies of this version were built and used by interviewers from Infratest in the pilot study.

Development of a prototype for an electronic version also was begun. However, due to various complications which would have required unacceptably high expenses to correct, this was not completed.

In early August, a small number of pretests were carried out in Mannheim by Muller, Pool, and Wehrli and in Munich by Infratest. The purpose was to determine whether or not respondents varying in socioeconomic background characteristics could

complete the interview in a reasonable length of time (the goal was an average interview duration of approximately 90 minutes) and to determine if respondents could understand how to use the new measuring instrument and what interviewer instructions were necessary.

By the end of August, the results of the pretest had suggested a few minor revisions in the second version of the interview schedule for the pilot study. These were then taken into account by Infratest in their preparation of the final interview schedule.

In the Fall of 1973, Infratest administered interviews of approximately 90 minutes duration to 259 respondents drawn from three research sites: Dorn-Dürkheim, a village in the predominantly agricultural state of Rheinland-Pfalz, which had shown relatively high support in the late 1960's for a party of the extreme right (Nationaldemokratische Partei Deutschlands); Schöna_u, a working-class section of the industrial city of Mannheim, which had shown relatively high support in the late 1940's and early 1950's for a party of the extreme left. (Kommunistische Partei Deutschlands); the University of Heidelberg, where relatively high levels of aggressive political protest had taken place during the academic year 1972-73. Random samples of N=90 were drawn from adult residents of Dorn-Dürkheim and Schöna_u; a quota sample (N=79) of professors, students, and lower-ranking faculty members (Mittelbau) was drawn from the University of Heidelberg. These sites were chosen in order to

provide a diversity of community types and to secure greater than normal variation on attitudinal and behavioral variables relevant to political support/opposition.

During Winter 1973-74, and Summer 1974, an intensive analysis of the pilot study data was undertaken by Muller at the University of Mannheim. Muller prepared three reports of findings from the pilot study: "Political Behavior: Reinforcement Influences and Behavioral Intention" (36 page manuscript); "Illegitimacy of Authorities, Vicarious Reinforcement for Protest, and Protest Behavior" (42 page manuscript); "Political Support and Alienation: Relationships Between Measures of Certain Analytic Dimensions" (76 page manuscript). In the Summer of 1974, Muller, Wildenmann, and Pool met at the newly founded Zentrum für Umfragen, Methoden und Analysen in Mannheim to discuss the findings of the pilot study and develop the interview schedule for the theory-testing phase.

Three measures of support/opposition served as criterion variables: (1) Potential for Violent Protest, a scale ranging from lack of readiness to engage in any unconventional protest, at the low end, to readiness to engage in a variety of unconventional protest, including political violence, at the high end; (2) Protest Action, a simple summation of the number of unconventional protest behaviors in which the respondent actually had engaged; (3) Preference for Antiregime Party Control of Government, a scale ranging from belief that the Deutsche Kommunistische Partei (DKP) or Nationaldemokratische Partei Deutsch-

lands should be forbidden, at the low end, to belief that the DKP or NPD should be the majority party in the government, at the high end. These criterion variables were correlated with indicators of affect for the political system affect for the incumbent administration, satisfaction/dissatisfaction with personal achievement in respect to important goods and conditions of life, and mastery/powerlessness. On the basis of the correlational analysis those indicators that turned out to be the best predictors of the criterion variables were retained for inclusion in the theory-testing phase. In cases where all indicators of an abstract concept turned out to be poor predictors of the criterion variables, completely new measures were developed for the theory-testing interview schedule.

Many of the abstract concepts were operationalized by traditional category scales and by the Opinionometer scales. In every instance, the category scales proved to be superior predictors of the criterion variables than the Opinionometer scales. Analysis of a set of questions included as a check on whether respondents had understood how to use the device indicated that a non-trivial proportion appeared to have been confused. Thus, the version of the Opinionometer used in the pilot study did not appear to have improved measurement, and it was decided not to employ the instrument in the theory-testing phase.

THE THEORY-TESTING PHASE

Personal interviews were carried out with 2663 adults in the Federal Republic of Germany during the Fall of 1974, by Infratest. The interview protocol averaged slightly over 60 minutes to complete.

There were twelve sampling sites in all, four rural, two urban, and six university communities. Each was selected because, in the aggregate, opposition to the regime had been manifested there during the preceding five years at higher than average levels. In the rural and urban sites opposition to the regime had taken the form of voting support for extreme left and extreme right political parties; in the universities it had taken the form of civil disobedience and political violence.

The rural sites were four small villages: Friederichskoog and Neuenkirchen in northern Germany, Erpolzheim and Mauchenheim in southern Germany. From these sites a total of 569 persons was interviewed, of which 479 were drawn randomly from lists of eligible voters, 90 were drawn from lists of community influentials obtained from discussions with the mayor and other community leaders by the chief of the team of interviewers for each site. The urban sites were working-class sections of Bremen in northern Germany and Nürnberg in southern Germany. From these sites a total of 990 persons was interviewed, of which 928 were drawn randomly from lists of eligible

voters, 62 were drawn from lists of community influentials compiled from nominations submitted by persons in the eligible voters sample who were active in local organizations. The university sites were six of the major universities in West Germany: Berlin, Bochum, Frankfurt, Heidelberg, Köln, and München. A total of 1104 students and faculty from the arts and sciences at these universities was interviewed, of which 956 were drawn by quota sampling, 148 were drawn from lists of influential persons in various university organizations compiled from nominations submitted by persons in the quota sample.

Two major considerations of the research design were (1) to elicit variation in individual attitudes and behavior sufficient for reliable multivariate analysis and (2) to investigate the effect of community context on relationships between attitudinal variables and behavior. An additional consideration was to avoid completely sacrificing representativeness at the altar of enhanced variation. While the communities chosen are by no means representative of West Germany as a whole, they do capture basic regional and community-size differences.

During 1975 and 1976, the data were analyzed and two preliminary reports were prepared by Muller. Pool was unable to participate in this phase of the project because of other research commitments. The preliminary reports were: "Relative Deprivation, Systemunterstützung, Kontext des Ortes und Aggressives Politisches Verhalten," delivered at a meeting of the Institut für Sozialwissenschaften, University of Mannheim, July 1975 (an English

version was delivered at the 71st Annual Meeting of the American Political Science Association, San Francisco, California, September, 1975); "A Model for Prediction of Participation in Collective Political Aggression," delivered at the 10th World Congress of the International Political Science Association, Edinburgh, Scotland, August, 1976.

From 1976 to 1977 Muller worked on the preparation of a book manuscript, Aggressive Political Participation (forthcoming, Princeton University Press, 1978), in which the empirical test of the theory was presented. The theory, called the Expectancy-Value-Norms theory, is derived from a general theory of behavior formulated by the psychologist Martin Fishbein. It consists of a set of social-psychological motivational concepts: utilitarian incentive for aggressive action, normative incentive for aggressive action, and social norms about the desirability of aggressive action. Careful attention was paid to the problem of formulating an auxiliary theory for conversion of these highly abstract concepts into observable quantitative variables.

The dependent variable of the study was constructed from a set of questions dealing with actual and intended participation in behavior that is illegal, has political significance, and involves group activity on the part of non-elites. These components of aggressive political behavior were weighted by a constant that reflects the differing social cost of each action. The result is a quantitative measure that affords quite fine discrimination in magnitude of aggressive political response,

ranging from degrees of inactivity at the low end of the scale to degrees of political violence at the high end.

Expressed as a formal equation, linear in the parameters, the model for the Expectancy-Value-Norms theory was compared with a variety of alternative explanations of variation in aggressive political response, including an Expectancy-Utility model and a Relative Deprivation model. Ordinary least squares regression was used to estimate the parameters of the models. Key predictions of the alternative models were not supported by the data, but the principal predictions of the Expectancy-Value-Norms model were upheld. Moreover, the describing variables in the Expectancy-Value-Norms model showed an unusually high level of predictive accuracy for data from such a large and heterogeneous sample of individuals.

Special attention was given to the development of an auxiliary theory of the concept of frustration in order to test an application of the frustration-aggression hypothesis to aggressive political participation. The results indicated that previous empirical research--which has turned up singularly unimpressive relationships between aggressive political participation and indicators of frustration--has been compromised by inadequate conceptualization and measurement of the frustration concept. Magnitude of aggressive political response showed a clear tendency to vary directly with amount of frustration, as indexed by unrealized expectations in reference to that level of a value which a person feels he justifiably deserves. However, even using the "just deserts" measure of frustration, the rela-

tionship between frustration and political aggression was shown to be indirect, mediated by the variables in the Expectancy-Value-Norms model.

The Expectancy-Value-Norms model was subjected to an extensive validity check by taking into account variables that encompass social background characteristics, personality attributes, and experiences people have with the day-to-day performance of the political system. When these variables were introduced into the prediction equation for aggressive political participation the parameter estimates describing the impact of the Expectancy-Value-Norms variables remained quite stable, suggesting that the model was reliable. Also, none of these additional variables were estimated to have any direct effect on aggressive political participation, an indication that the model affords a relatively complete explanation.

THE CROSS-VALIDATION PHASE

The determination that variables derived from other hypotheses and models were superfluous established the validity of the Expectancy-Value-Norms model for the 1974 sample. But this was only a first and comparatively small step in the direction of validating the model. The critical step entails the reproducibility of the model. Do the weights (or causal parameters) reflect general laws or are they simply idiosyncratic to the particular case of the 1974 sample? To determine the reproducibility of the model, one must first cross-validate it. Cross-validation requires that the model be tested again for either a different sample from the same population or the same sample at a later point in time. If the cross-validity of the model is established, then it is desirable to carry out a validity generalization study, where validity generalization is determined by testing the model for a sample from a different population.

The cross-validation phase of the Indikatoren project entailed reinterviews in the fall of 1976, with 49 percent (N=1310) of the original respondents. Research on this phase was carried out by Muller in the summer of 1977 at the Zentrum für Umfragen, Methoden und Analysen in Mannheim.

The cross-validity of the Expectancy-Value-Norms model may be determined as follows:

- 1) Estimate the parameters of the model for the 1974 full sample, the 1974 panel sample, and the 1976 panel sample. These parameters should not fluctuate markedly.
- 2) Use the parameters from the 1974 full sample to predict Aggressive Participation in the 1974 panel sample and the 1976 panel sample. Predictive accuracy (as determined by R^2) should not fluctuate markedly.
- 3) Use the parameters from the 1974 panel sample to predict Aggressive Participation in the 1976 panel sample and use the parameters from the 1976 panel sample to predict Aggressive Participation in the 1974 panel sample. Predictive accuracy should not fluctuate markedly.

The Expectancy-Value-Norms model estimated for the 1974 full sample was:

$$(1) \text{ APP}_{1n} = 1.390 + .044 (\text{UJA}) + .003 (\text{NJA}) + .236 (\text{UNV}) \\ \quad \quad \quad (.005) \quad \quad \quad (.0006) \quad \quad \quad (.039) \\ \quad \quad \quad + .046 (\text{A}) + .004 (\text{UNV} * \text{NJA}) \\ \quad \quad \quad (.007) \quad \quad \quad (.0006)$$

where $R^2 = .569$ and $N = 1838$.

The variables in the equation are defined as:

APP_{1n} = natural logarithms of the Aggressive Political Participation scale. Range: 1.54 to 4.52.

UJA = Utilitarian Justification for Aggression defined as degree of belief in the efficacy of collective political aggression weighted according to whether a person's political influence capability is regarded as unnecessary (ECA scores reduced to zero), sufficient (ECA scores unchanged), or insufficient (ECA scores doubled). Range: 0 to 14.

NJA = Normative Justification for Aggression defined as the product of the square of a person's degree of alienation from the structure of political authority times his degree of leftist ideological commitment. Range: 0 to 230.4.

UNV = a dummy variable coded as "1" if the individual lives in a university community, "0" otherwise.

A = an index of pure availability for collective action defined as the sum of the reciprocal of a person's age in years, facilitative marital status, and facilitative employment status.

UNV * NJA = interaction between social norms and personal normative beliefs.

The parameters of the Expectancy-Value-Norms model for the 1974 panel sample were estimated to be:

$$(2) \text{ APP}_{\ln} = 1.468 + .042 \text{ (UJA)} + .022 \text{ (NJA)} + .226 \text{ (UNV)} \\ \quad \quad \quad (.007) \quad \quad \quad (.0007) \quad \quad \quad (.005) \\ \quad \quad \quad + .035 \text{ (A)} + .004 \text{ (UNV * NJA)} \\ \quad \quad \quad (.009) \quad \quad \quad (.0008)$$

where $R^2 = .434$ and $N = 913$.

The parameter estimates for the 1976 panel sample were:

$$(3) \text{ APP}_{ln} = 1.579 + .054 \text{ (UJA)} + .003 \text{ (NJA)} + .284 \text{ (UNV)} \\ (.010) \quad (.0009) \quad (.069) \\ + .037 \text{ (A)} + .005 \text{ (UNV * NJA)} \\ (.013) \quad (.0012)$$

where $R^2 = .396$ and $N = 922$.

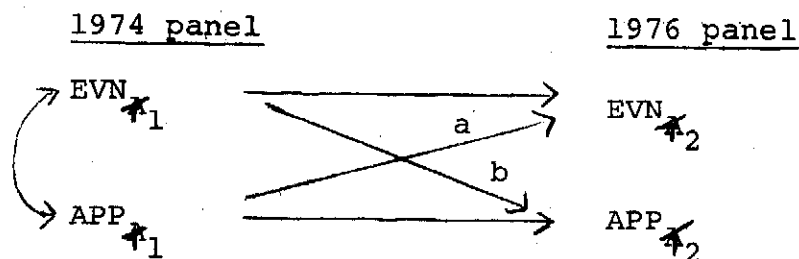
As equations (1), (2), and (3) show, the parameters of the Expectancy-Value-Norms model are remarkably consistent across samples. This suggests that the regression weights represent general laws which hold for this population.

The predictive accuracy of the model is reduced for the panel samples as compared with the full sample. This is because the standard deviations of the variables in the panel study are all considerably smaller than the standard deviations of the variables in the 1974 full sample, and the size of the multiple correlation coefficient will be smaller, the less the variability, everything else being equal.

When the weights from equation (1) are inserted into the prediction equation for Aggressive Political Participation in the 1974 panel sample, the R^2 Value is .411. When these weights are inserted into the prediction equation for Aggressive Political Participation in the 1976 panel sample, the R^2 Value is .412. This finding is strong testimony for the generality of the full sample weights. Also, when the weights from equation (3) are inserted into the prediction equation for Aggressive Political Participation in the 1974 panel sample R^2 Value is .441, as

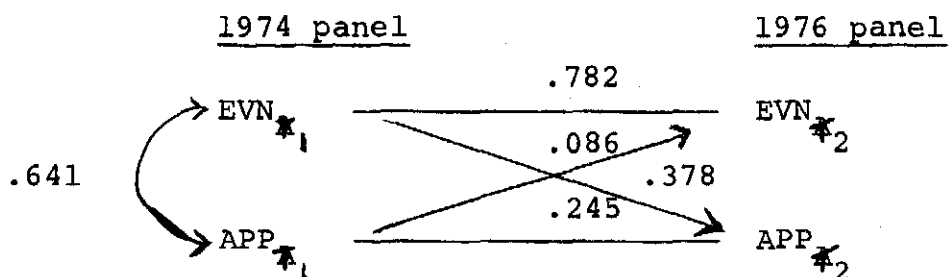
compared with an R^2 Value of .389 for the weights from equation (2) used to predict Aggressive Political Participation in the 1976 panel sample. These R^2 Values are sufficiently similar to indicate that the weights estimated from the panel samples are basically interchangeable.

In addition to providing information about the generality of the Expectancy-Value-Norms model for this population, the panel data also can be used to check on the direction of causality. Is it correct to assume that the flow of causality runs unidirectionally from the Expectancy-Value-Norms Variables? Or could some of the association between the putative independent and dependent variables be due, in reality, to a reverse flow of causality, with the participation variable exerting a causal influence on the Expectancy-Value-Norms variables? The direction of causality question can be answered by estimating the parameters of the following model:



Where the EVN terms are the predicted APP values on the basis of the 1974 and 1976 panel sample predictor variables weighted by the 1974 full sample regression coefficients.

If the flow of causality is unidirectional from the Expectancy-Value-Norms Variables to Aggressive Political Participation, the path coefficient for arrow b should be of a non-trivial magnitude, and the path coefficient for arrow a should be close to zero. The results are:



Since the estimated effect of APP_{A1} on EVN_{A2} is less than .1, while the estimated effect of EVN_{A1} on APP_{A2} is fairly sizeable, one can conclude that the relationship between Aggressive Political Participation and the Expectancy-Value-Norms Variables is, indeed, unidirectional, both the latter causing the former.

APPENDIX:

THE OPINIONOMETER:
PURPOSES, DESIGN, AND OPERATION

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The Opinionometer is an instrument for the recording of opinions, attitudes, and ratings at a nominal, ordinal, interval, and ratio levels of measurement. It can be used as an aid in interviews or as a means for the registration of responses to self-administered questionnaires. It has several models, described below, some or all of which possess each of the following qualities:

- a) It is compact and easily portable by interviewers in the field.
- b) It requires no external power source;
- c) It permits respondents to record their responses with or without secrecy vis-a-vis the interviewer;
- d) It can be quickly adjusted to take responses selected from a finite number of response alternatives or from a range of continuous variability;
- e) Response continua can be quickly adjusted to be short and finite, long and finite, or infinite (endless);
- f) Sets and ranges of response alternatives can be marked as the administering agency prefers, and markings can be quickly interchanged;
- g) It allows the respondent to register up to twenty opinions, attitudes, or ratings synoptically, and

thus to make direct, revisable comparisons, in addition to the customary procedure of sequential questioning;

- h) It can record responses either statically or dynamically;
- i) It records responses directly on a machine-readable medium, eliminating the need for coding, punching, and verifying of responses.

The basic design of the Opinometer is a box, approximately the size and shape of an attache case, containing a recording medium and recording machinery. The box is intended to be laid flat on a table. The upper surface serves as a receptacle for interchangeable "panels" and "scales". A "panel" is a flat piece of rigid material, containing, or constituting a boundary of, a slot in which one or more "pointers" can be located. The slot can be straight and bounded, or can curve at one or both ends to a right angle with its principle direction. Curved slots can be configured so that they interlink to form either a snake-like slot of variable length or an elongated ring. The Opinometer can accommodate up to twenty slots. A "pointer" is an object that can be held between two fingers and moved at will along the slot in which it is located, and which either maintains a constant moderate friction against its slot or can be moved only when depressed, lifted, pressed to one side, or squeezed, so as to resist inadvertent movement. A "scale"

is a printed sheet that can be fitted on to one or more panels and which contains a sequence of numbers, a grid, a series of labelled marks, or other indications of the response alternatives and how the pointer should be positioned to choose each alternative. Slots configured as rings can be fitted with "counters", which record the number of times a pointer has passed the origin in a given direction. Panels can also be fitted with "detent strips", which are devices providing comparatively low pointer friction at a finite number of adjustable points along the slot, for use with category scales. The box can be fitted with a "shield", which is a foldable opaque screen that keeps the movements and positions of the pointers out of the view of the interviewer when this is desired. The Opinometer is constructed modularly, so that each of the above features can be used or not as needed.

The Opinometer has three different models, distinguished by the complexity of their recording systems. Model I contains no recording device at all; it is intended for training purposes and for applications where only category scales are used and it is deemed more economical for the interviewer to transcribe all responses before the Opinometer is reused.

Model II contains a simple static-only recording device. Pointers for Model II contain snap-on ink-wells with downward pointing wicks. Counters for Model II are also inked. The ink is of a type that can be sensed by optical scanning devices. The recording medium is a specially shaped piece

of heavy-weight paper, which is normally provided as a perforated continuous form. Before the set of responses is to be given, the paper is advanced by moving the "new sheet" lever, which moves exactly the right length of paper from the feeder roll on to the take-up roll by means of a sprocket wheel that engages holes in each edge of the paper. As an alternative, recording sheets may be obtained singly and fed into the box through a slot, ignoring the roller mechanism. After the responses have been entered, a handle on the box is pressed. This handle raises a platform under the sheet, which puts the sheet into contact with the wicks of all pointers, and with the numbers of all counters, making machine-readable marks on the sheet. The sheet may then be advanced if on rollers or replaced if inserted singly, providing a new sheet for the next set of responses. Since the slots are about three times as far apart as the minimal acceptable distance between columns on machine-scannable sheets, however, Model II also contains a "sheet-positioning lever", which can be moved to a second and then a third position, thus allowing up to three sets of observations per sheet. The sheets are automatically readable by optical scanning devices, which can convert all analog responses to digital form and can transcribe all observations onto conventional machine-readable cards or tape for tabulation and analysis. Markings on the sheets are also eye-readable, however, and a matrix form is provided with Model II for superimposition on a sheet to reveal one of its three sets of records at a time for visual

inspection or coding. Take-up spools are replaceable, lightweight, and flanged at both ends, so that any amount of recording paper already recorded may be torn off and mailed in by an interviewer using specially provided mailing tubes with internal diameter equal to the diameter of the spool flanges. The new leading edge of the paper roll may then be attached to a new spool.

Model III makes a static, dynamic, or static-dynamic record directly on standard magnetic computer tapes. By use of a "recording mode" lever, the user can change the preferred type of recording. Static recording makes an analog record of the position of each pointer and counter at each moment when the "record" button is pressed. Dynamic recording makes a continuous, constant-speed, parallel, analog record of the position of each pointer and counter as long as the "continuous record" switch is set to "on". And static-dynamic recording makes the same kind of record as dynamic recording, but marks the record whenever the "record" button is pressed, allowing the respondent or administrator to signify which configurations of pointers are final decisions, as opposed to tentative decisions and transitional states.