Mean bird

Edited 15 July 1978

24 April 1978
For the Didactic Seminar on
Metric Multidimensional Scaling.
Chicago 25 April 1978

Reflections on Woelfel and the Galileo System

by Archibald O. Haller
University of Wisconsin

A Bit of Ancient History. This story takes up in the mid-1960s and really concerns Joseph Woelfel. But to locate his work it is necessary to recount and cite some research from a previous stream of thinking into which his own ideas penetrated and flowed for awhile. In 1965 Joe Woelfel had been teaching for awhile at Canisius College. He had already finished his doctoral preliminary examinations in sociology at the University of Wisconsin, and was interested in getting more involved in research. At the time Wisconsin was looking for someone to head up a research project in the general area of status attainment. Specifically, its objectives were to learn how to identify a youth's "significant others" (SOs), whomever they might be and however many or few they were; to identify the ways by which they influenced a youth's status aspirations; and to learn how to measure the variables describing the influence they brought to bear on the youth. While a start on the problem had already been made, the main advances were still to come. He came to Madison to work on the project, and this was the start of our collaboration.

Perhaps we were optimistic, but already in 1965 we were pretty sure that status aspiration levels had a large determining affect on the corresponding subsequent status attainments. This was despite the fact that the first of the two-or-more time-period panel analyses required to establish this had not yet progressed far enough to provide the necessary evidence. Of course, today the evidence overwhelmingly supports the hypothesis, and researchers

now treat it as fact, no longer as conjecture. Furthermore, we had good reason to believe that SOs did indeed do something which helped to structure the youths' status aspirations. Long before this, it had been shown that youths' status aspirations were associated with their parents' socioeconomic status (Sewell, Haller, and Straus, 1957). Even earlier Kahl (1953) had shown that within a status level, a youths' status aspirations varied considerably. Evidently, the parents of the youths Kahl studied, though ordinary working class people, had inculcated diverse status goals in their offspring. But how this was done remained a mystery. Later, Butterworth and I (Haller and Butterworth, 1960; also Duncan, Haller, and Portes, 1968) and Alexander and Campbell (1964) provided evidence strongly suggesting that peer friends might affect each others' status aspirations. But again the mechanisms by which this might have been effected remained unknown. In the early 1960s we came to realize that parents and friends were, socio-psychologically, subsets of the more inclusive construct, "significant other", that had been specified near 25 years earlier by Harry Stack Sullivan (1940). He came to it by means of a close study of George Herbert Mead's (1934) concept of the "generalized other", together with considerable careful observation of his own psychiatric patients. In the summer of 1964, a couple of us were collaborating on an analysis of occupational status aspirations of farm-reared Wisconsin boys. We were able to show that variables we considered to be measures of SOs' expectations were rather strongly related to the dependent variable (Haller and Sewell, 1967). But again the mechanisms of this influence were not clear. Besides, the SOs were identified a priori as parents and peer friends. Even then it seemed unlikely that these two a priori categories were sufficiently broad to include all of the persons who served as youth's SOs.

Such was the state of knowledge of the key social psychological processes in status attainment as of the time that Woelfel began to work on the problem. Joe had already thought through much of the basis of what later came to be called the Galileo system, and he brought his ideas to bear on the identification of significant others. These ideas were elaborated and specified in connection with a series of long interviews he and the rest of the research team (including Edward Fink, who joined the project soon after it started) conducted with selected youths and other persons whom they identified and whom we conceived to be their SOs. To make a long story short, Joe blended Meadian and Lewinian social psychology—as, in my opinion, he has done again and again since then—and reasoned that one person influences another by indicating to him the conceptual categories, "filter categories", describing him: placing him in a category ("defining the self") or refining a category ("defining an object"), or both. We saw these processes as occurring through modeling and defining. A model is an SO who influences one by exemplifying a definition of the self or object. A definer is an SO who influences one by telling him about himself. (Woelfel, 1967; Haller, Woelfel and Fink, 1969: 22-30.) In practice we used the number of ways a given SO influenced a youth as a sort of screen to isolate those SOs who were really most influential. The whole group, including Ed and Alejandro Portes (now in Sociology at Duke University), and some others who were less inclined to social psychology, carried on a running debate, partly in conversation, partly in joint writing, and partly in missives that we wrote to each other. As I recall, all four of us—Woelfel, Fink, Portes, and I—were quite deeply involved in these discussions. Indeed, some of us, with Sewell, were then also working on a paper which for the first time applied path analytic techniques to two-point data

regarding a social psychological conception of status transmission. Woelfel's working paper, "A Paradigm for Research on Significant Others (1967) and the latter paper (Sewell, Haller, and Portes, 1967) were both presented at the annual meetings of the American Sociological Association in San Francisco in 1967. Woelfel's paper laid out the main lines of the theory which guided the project. It marked the beginning of a new attack on identifying SOs and determining the cognitive-interaction variables which formed status aspirations. The other paper was important, too, because it provided the first truly convincing evidence of the usefulness of the search for SOs and the processes by which they influence youths' status aspirations. Measures of youths' educational and occuaptional aspirations turned out to be highly predictive of their corresponding status attainments. In turn, their aspirations were shown to be strongly related to preliminary measures of SOs' educational exemplifications and expectations.

In the SO project, we learned that status models exert their influence on status aspirations of youths simply by exhibiting their status (adults) or their own status aspirations (school peers), and that definers exert their influence by communicating status aspirations to the youth—the statuses they demand of him, hope for him, think proper or possible for him, etc. In other words, the influence of models is due to what they show of <u>themselves</u>, while the influence of definers is due to what they tell the youth about <u>himself</u>. Of course, many SOs, such as parents, are both models and definers; and the statuses they exemplify to the youth and those they expect of him do not often correspond to each other. Status indications of SOs include the varying status exemplification levels of perhaps several models and the varying status expectation levels of perhaps several definers. Not all of this was clear

in the 1960s. But there was no doubt that the parameter to which a youth's status aspirations (say, educational aspirations) responded was the mean calculated over the corresponding status indications of all his SOs. This observation weighed heavily in Woelfel's later application of "force aggregation" theory to human behavior (Woelfel and Hernandez, 1972). Three articles (Woelfel and Haller, 1971; Haller and Woelfel, 1969; Haller and Woelfel, 1972) and a report (Haller, Woelfel, and Fink, 1969) grew out of the project.

Woelfel went to the University of Illinois's Department of Sociology about the time he completed his doctoral thesis. It would be an understatement to say that he was busy at this time. He was writing journal articles, teaching large classes, tutoring several outstanding undergraduates, and protesting the Vietnam war. But more important, he immersed himself in the mathematics of multivariate analysis and mastered what was coming to be known as metric multidimensional scaling. While I have not checked this out, I'm fairly confident that in his measurement of the distances between objects in psychological space ("If Y and Z are 100 Galileos apart, how many Galileos apart are W and X") he invented metric cognitive scaling independently of its invention by others. All the while he was busy writing and rewriting his main theoretical work which he calls the Galileo system.

The development of his system continued unabated as he moved to the Department of Communication at Michigan State University, joining his long time colleague from Canisius and Wisconsin, Donald Cushman, who was already there, and later being joined by another old colleague, Ed Fink. Since most of the remaining history is well-known to those of you present, let's now turn to the Galileo System.

The Galileo System. The Galileo System is Woelfel's name for his own system of behavior theory. It employs metric multidimensional scaling, but it is more than that. I do not intend to go into it in detail here; Joe himself and others will do that. Indeed, he spelled it out largely since leaving Madison, and our deepest collaboration preceeded that period in his life.

In my judgment, Meadian social psychology, a psychology of cognition, Lewinian psychology, and Durkeimian sociology are as important in the Galileo System as is MMDS. Specifically, I would say that the Galileo System proper has three distinctly different parts. The first is a spare and a powerful social psychological theory of cognition and behavior. The second is a mathematical statistical calculus, MMDS. The third is a set of techniques for mapping the theoretical constructs into the calculus.

Yet scientific issues are not closed when their basic research aspects have been classified. The Galileo System has a practical side which is socially perhaps at least as important as its abstract side. Just as the basic science of nuclear physics may be applied to the manipulation of energy, so the Galileo System has its potential applications regarding the manipulation of human social behavior. There would appear to be a form of behavior engineering devolving from the Galileo System which I would label "Woelfel's Social Behavior Induction Method (Woelfel's SBIM)." We shall return to this below, but for now let me make three comments about the proposed name of the technique. 1) One would guess that this may be merely the first of a series of SBIMs which may spin off from sociology. I have long believed that Meadian thought, in particular, has great potential power, which could be harnessed if it were coupled to an appropriate

quantitative research technology. So other SBIMs may come into being as time passes. 2) One might jump to conclusion that this is another form of what has come to be called "Behavior Modification." It is not. Woelfel's system—and probably the other imaginable SBIMs—has very little in common with any form of S-R theory including Behavior Modification. Behavior Modification methods are designed to be applied to individuals or small collectivities, with extrinsic rewards deliberately provided to specific individuals to induce each to respond in a specific way. On repetition these responses become conditioned behaviors. The SBIMs are aimed at very broad populations—such as buyers, sellers, and voters. They will use mass communication methods to change behaviors by shifting cognitions. Unlike Behavior Modification, SBIMs will not ordinarily be used to induce enduring new response patterns. They will not even employ extrinsic rewards. If anything, they will affect far more people than Behavior Modification will. So they should not be confused with Behavior Modification. 3) The last observation is obvious. If other SBIMs may emerge in the future, this one should be identified by the name of life inventor. Hence "Woelfel's Social Behavior Induction Method" would seem to be a proper name for the applied side of Woelfel's Galileo System.

The theory. Woelfel's social psychological theory holds that behavior is a function of information (cognitions), and that information can be systematically manipulated. It follows that behaviors can be manipulated by manipulating information. The theory presumes that human beings are, so to speak, matted together by dense networks of partially shared information. The information networks are held together by communication through language, and universes of discourse (sets of shared information) are collated by the

categories provided by language. Within any domain of shared information, specific objects exist which are both social and psychological. They are social because they are shared. They are psychological because each has a location in individuals' cognitive structures. They are shared by large, but finite, and therefore specifiable, populations. So a given domain will be applicable to a given population. Such a domain will contain a set of social objects pertaining to it. For example, a given election is applicable to, say, the legal voters of Detroit. The specific offices to be filled, the candidates who'd like to fill them, and the issues and parties distinguishing the candidates are among the social objects in the domain. Within the domain, each social object of which any member of a population is cognizant will have a location in the member's psychological space. That location can be described as a point in an n-dimensional space. Behaviors within the domain are adjustments in the relative location of the social objects. Adding new information which redefines one or more of the objects thus results in a somewhat different behavior than would have occurred without that information.

The method. MMDS is the method by which the social objects of a domain are located at a point in an average psychological space (Lingoes, 1977; Shepard, Romney, and Nerlove, 1972; Romney, Shepard, and Nerlove, 1972). In the case of the Galileo System (see: Barnett and Woelfel, 1976; Woelfel, Woelfel and Woelfel, 1977; Woelfel, 1973; Woelfel, 1974; and Woelfel and Danes, 1977), the metric is provided by asking each sample member of a given population to specify how many Galileos—arbitrary but equal units—apart are two given objects. By locating each object at an average point in an n-dimensional space, the researcher can mark the locations of each object at one time or successive times. There are at least three advantages to

this. 1) The observer can see the degree to which the population conceives objects as similar to or different from each other. Especially, he can note the distances of each from the self. People will favor things that are located close to the self (provided they generally like themselves), and oppose those things which are far from the self. 2) Trends in behavior can be determined by observing the changes in the locations of objects. 3) The effects of deliberate introductions of new information aimed at changing the population's definitions can be observed.

The mapping techniques. In light of the foregoing, the key unusual operational questions would seem to be 1) how to determine the objects pertaining to the domain, and 2) how to determine what new information to introduce in order to change the average location of objects. (The other technical problems seem to me to be those which, because they are common to all social research, such as sampling and question framing, do not merit any attention here.) I really do not know exactly how Woelfel determines which concepts to include as social objects within the domain. My guess is that he uses the same sort of artful sampling and interviewing that was used on the old SO project. Of course, he can tell you better than I. But on the chance that this might be a good guess, the guidelines could be the following: 1) Determine the main contrasting social roles that divide the pertinent population—men-women, young-old, etc. 2) Draw one or two persons from each of the cells generated by cross-classifying these social roles, each set of contrasting roles now being treated as a variable. This gives a purposive sample cutting across the whole range of the population. 3) Beginning with the interviewer's own general knowledge of the conceptual domain, conduct depth interviews with each sampled person, probing to learn what each considers the main objects

to be. (Differences crossing roles imply differences among role incumbents regarding the importance or even presence of specific cognitive objects. So sampling as conducted under 2) is likely to uncover objects that are more salient to those in some roles than in others, and is thus likely to permit an inclusive set of objects to be identified.) 4) These will be identified by many different specific words for any one respondent and certainly a great many overall respondents. Moreover, different respondents will emphasize different objects. 5) The nouns mentioned by each respondent would be placed into a smaller number of generic categories. 6) Certain of the latter will be mentioned with great frequency. These would then be included on a formal interview schedule to be administered to a sample from which parameters may be estimated.

But how to change cognitions? Here new information would be added. Woelfel has a system for doing this, called the "automatic message generator." I do not know how it works. However it does it, the result is a small set of messages designed to shift specific social objects to new locations in psychological space.

My general point so far is that the Galileo System is more than MMDS. It is a theory and technology of human social behaivor analysis which employs MMDS as its calculus.

Social Behavior Induction Methods. I'd like to conclude by pointing out that, if indeed the theory works, its engineering potentials are impressive. The first thing, of course, is for others to try to learn how to use the System and to check out its practical potential. Assuming that it works effectively, we can foresee the possibility that it will be widely applied in advertising, political campaigning, and diffusing new information. Its application would

form an elite-mass relationship between those who know how to use it and have the means to do so, on the one hand, and the publics pertaining to the domains in which they are interested, on the other. It would provide a method by which the elites could learn a great deal about the domain-relevant conceptions of the populations they wish to influence. In this way the public will doubtless affect the elite; in effect, telling the elite that they, the public, are more likely to be swayed by 'this than by 'that.' Second, it will make it possible for the elites to use the technology for changing cognitive structures so as to change the average behaviors of the populations. Thus, like so many advances in knowledge, SBIM will be a two-edged sword. It is a tool which elites could use to improve their understanding of public needs and thus be better able to serve them. It could also be used cynically, to more effectively manipulate the public in the service of the ends of the elite. This has obvious ethical and legal ramifications that others may want to look into.

On the political side (see: Serota, Cody, Barnett, and Taylor, 1977; and Woelfel, Fink, and Taylor, 1976), if no one party in a multi-party system obtains a monopoly of the method, my guess is that in the long run it would make the candidates and the elected officials better informed about what their constituents think. In such a case, each party's use of the cognitive change technology would probably tend to cancel that of the other. The candidates, however, would have a better understanding of the interests their constituents have in the campaign. It might well make elected representatives more deeply aware of the views of their constituents. The best guess is that they would therefore be better public servants. Of course, it is possible that the quality of leadership might suffer to the extent that leaders responded only

to factors known to their followers, ignoring potentially pertinent events and contingencies as yet unrecognized by ordinary people. Possibly, politicians, knowing more about what their voters thought, might at times be more inclined to follow than to lead them. Nothing need be said about SBIM in a one-party system or a dictatorship. Its affects would appear to be obvious.

One last point. It has been noted that time and time again enthusiastic communications researchers have proposed methods they believe will have powerful affects on human social behavior. They rarely work. So the skeptic may think that Woelfel's SBIM may be just another flash in the pan. Of course, this may turn out to be the case. But I doubt it. On the contrary I think the prospects that it will work as predicted are really quite good. The Galileo System is conceptually quite close to the social psychological theory of status attainment, a theory which, after more than two decades of research, using long-term two-point panel studies, seems to work quite well (Sewell, Haller, and Portes, 1969; Sewell, Haller, and Ohlendorf, 1970; Alexander, Eckland, and Griffin, 1975; Otto and Haller, 1978). In other words, through research on the social psychology of status attainment and through the Galileo System which is conceptually very similar to it, the social psychological perspectives of Mead and Lewin have been blended, and the blend has been expressed in terms that have lent themselves rather well to careful quantitative tests. In the status attainment area and in Woelfel's successful extensions of the parts of it dealing with significant others into other areas of behavior such as marijuana smoking, Canadian separatist movements (Woelfel, McPhail, and Gillham, n.d.), etc., the tests have strongly tended to support the theory. So it seems reasonable to expect that the practical application of the Galileo System to the induction of social behavior will also turn out

to be successful. The next steps are for other researchers to subject the theory to careful tests, while simultaneously beginning to map the social consequences which will ensue if indeed the theory works.

REFERENCES

Alexander, C. Norman, and Ernest Q. Campbell
1964 "Peer influences on adolescent educational aspirations and attainments." American Sociological Review 29 (August):568-575.

Alexander, K., B.K. Eckland, and L.J. Griffin
1975 "The Wisconsin model of socioeconomic achievement: a replication." American Journal of Sociology 81 (September):324-342.

Barnett, George A., and Joseph Woelfel
1976 "On the Dimensionality of Psychological Processes." Paper presented at the annual meeting of the Psychometric Society, Bell Laboratories, Murray Hill, NJ (April).

Duncan, Otis Dudley, Archibald O. Haller, and Alejandro Portes
1968 "Peer influences on aspirations: A reinterpretation." American Journal of Sociology 74 (September):119-137.

Haller, Archibald O., and Charles E. Butterworth
1960 "Peer influences on levels of occupational and educational aspiration." Social Forces 38 (May):289-295.

Haller, Archibald O., and William H. Sewell
1967 "Occupational choices of Wisconsin farm boys." Rural Sociology 32 (March):37-55.

Haller, Archibald O., and Joseph Woelfel
1969 "Identifying significant others and measuring their expectations for a person." Revue Internationale de Sociologie (September):395-429.

Haller, Archibald O., and Joseph Woelfel
1972 "Significant others and their expectations: concepts and instruments to measure interpersonal influence on status aspirations." Rural Sociology 35 (December):591-621.

Haller, Archibald O., Joseph Woelfel, and Edward L. Fink
1969 "The Wisconsin Significant Other Battery: Construction, validation, and reliability tests of questionnaire instruments to identify 'Significant Others' and measure their educational and occupational expectations for high school youth." Madison: University of Wisconsin, Final Report to U.S. Office of Education, Project No. 5-1170 (Mimeograph; also microfiche).

Kahl, Joseph A.
1953 "Educational and occupational aspirations of 'Common Man' boys." Harvard Educational Review (Spring):186-203.

Lewin, Kurt
1939 "Field theory and experiment in social psychology." American Journal of Sociology 44 (May):868-897.

Lingoes, James C.
1977 Geometric Representations of Relational Data. Ann Arbor, Michigan: Mathesis Press.

Mead, George H.
1934 Mind, Self, and Society. Chicago: University of Chicago Press.

Otto, Luther B. and Archibald O. Haller
1978 "Evidence for a social psychological view of the status attainment process: Four studies compared." Social Forces (in press).

Romney, Kimball A., Roger N. Shepard, and Sarah Beth Nerlove
1972 "Multidimentional Scaling: II." New York: Seminar Press.

Serota, Kim B., Michael J. Cody, George A Barnette, and James A. Taylor
1977 "Precise Procedures for Optimizing Campaign Communication." Presented at the annual International Communication Association Convention, Berlin, Germany (June).

Shepard, Roger N., A. Kimball Romney, and Sarah Beth Nerlove
1972 Multidimensional Scaling: I. New York: Seminar Press.

Sewell, William H., Archibald O. Haller, and George W. Ohlendorf
1970 "The educational and early occupational attainment process: replications and revisions." American Sociological Review 35 (December):1014-1027.

Sewell, William H., Archibald O. Haller, and Alejandro Portes
1967 "Educational and occupational achievements of Wisconsin farm boys." Paper presented at the meetings of the American Sociological Association, San Francisco (September).

Sewell, William H., Archibald O. Haller, and Alejandro Portes
1969 "The educational and early occupational attainment process." American Sociological Review 34 (February):82-92.

Sewell, William H., Archibald O. Haller, and Murray A. Straus
1957 "Social status and educational and occupational aspiration." American Sociological Review 22 (1), (February):67-73.

Sullivan, Harry Stack
1940 Conceptions of modern psychiatry. Washington, D.C., W.A. White Psychiatric Foundation.

Woelfel, Joseph
1967 "A paradigm for research on significant others." American Sociological Association, San Francisco (September).

Woelfel, Joseph
1973 "Multivariate Analysis as Spatial Representations of Distances." Presented at the ASA meetings, New York (August).

Woelfel, Joseph
1974 "Metric Measurement of Cultural Processes." Paper presented to the Speech Communication Association Annual Meetings, Chicago (December).

Woelfel, Joseph, and Jeffrey E. Danes
1977 "New Techniques for the Multidimensional Analysis of Communication and Conception." Chapter written for Multivariate Analysis in Communication Research. P. Monge and J. Cappella (Eds.).

Woelfel, Joseph, and Archibald O. Haller
1971 "Significant others, the self-reflexive act and the attitude formation process." American Sociological Review 36 (February):74-87.

Woelfel, Joseph, Edward L. Fink, and James Taylor
1976 "A Mathematical Procedure for Optimizing Political Campaign Strategy." Paper presented at the International Communication Association Convention, Portland (April).

Woelfel, Joseph, Thomas McPhail, and James Gillham
n.d. "Political Radicalization as Differential Socialization The Learning of French-Canadian Separatism." (Mimeographed).

Woelfel, John C., Joseph D. Woelfel, and Mary Lou Woelfel
1977 "Standardized Versus Unstandardized Data Matrices: Which Type is More Appropriate for Factor Analysis." Paper presented at the annual meeting of the American Sociological Association (September).