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ABSTRACT

The following characteristics of Woelfel and Haller's (1971) Linear Force Aggregation Theory (LFAT) recommend its use to persuasion researchers. It is primarily a descriptive theory that interrelates theoretical propositions with measurement techniques and thereby allows for the generation of precise predictions that can be falsified. Emphasis on description and prediction is the necessary and crucial first step in the formulation of an explanatory social theory; these have been consistently disregarded by previous theories of attitude change. The highly inferential and empirically unjustified assumption that attitudes cause behavior (or that behavior causes attitudes) across all situations is redefined in LFAT so that each is a function of the amount of information received about a particular topic. Redefining the attitude-behavior and/or behavior-attitude causality issue in this manner makes their approach a communication perspective on the development and change of attitudes. Thirdly, Woelfel and Haller take as axiomatic that significant others effect an individual's attitudinal structure and must be included in an adequate theory of attitude change. (Author/LL)

A Critical Review of Linear Force Aggregation Theory

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Social scientists have spent considerable time, money and effort on studying the formation and change of attitudes. Even a cursory examination of psychological, sociological and communication journals over the past decades suggests that the persuasion process may well be the most, and certainly is one of the most, studied aspects of human behavior. Despite this massive amount of effort, the attitude change process has not been well described, various theoretical predictions have received minimal and contradictory support, and explanations tend to be of a post hoc nature emphasizing variables other than those measured and/or included in the theory which could have accounted for the empirical findings. All of this suggests that the theories and/or measurement practices primarily in use have not significantly aided our scientific understanding of attitude change and development. The purpose of this paper is to review a new theory that may sharpen our understanding of the persuasion process, Woelfel and Haller's (1971) Linear Force Aggregation Theory. For comparison purposes, a brief review of where much of the field has been will first be included.

Previous Theoretical Positions

Heider's (1946, 1958) balance theory represents the general scientific paradigm that has generated most of the attitude change research. Several variations of Heider's balance model have been developed over the years (e.g. Festinger's Cognitive Dissonance Theory, 1957; Osgood and Tannebaum's Congruity Model, 1955; Rosenberg's Balance Model, 1956). Basically, these balance theories are explanatory behavioral choice models that focus on the individual's organized cognitive structure. They all have in common the following three assumptions. (1) Man prefers a state of cognitive consistency, or balance, or consonance depending on which theory is used. As individuals, we desire that our conceptions of things be internally consistent and not psycho-logically contradictory. (2) The introduction of inconsistent information into the individual's cognitive structure is psychologically discomforting. Contradictory messages and information will produce a degree of tension within the individual and place him in a situation of imbalance or dissonance. (3) Given the creation of this tension, an individual is motivated to

behave in some way calculated to restore cognitive balance.

Primarily, these various formulations differ on the criterion used for choice, on the way calculated to reduce the tension and restore the preferred state of cognitive consistency. They all have received some empirical support, but none has consistently been supported by the research.

Several reasons why these consistency models have failed to increase our understanding of attitude change can readily be discerned. For one thing they are basically explanatory models which do not precisely describe the attitudinal structure they are attempting to explain. Since the focus of analysis has primarily been explanatory and not descriptive, there has been little agreement between theoretical propositions and measurement techniques.* Even though an individual's attitudinal structure is conceived of as "organized set of cognitions regarding some object or event" (Cohen, p. 62), the organizational structure is frequently depicted with an over-simplified discrete-graphic representation rather than precise descriptions of which cognitions are interrelated and how organized and processed to form one's attitude. Although these graphic representations have pedagogical utility, they are not precise descriptions of the phenomenon of interest since they fail to describe what cognitions sum up to the overall positive or negative valance between the objects depicted.

Another common problem in the attitude literature which stems from this emphasis on explanation is that these balance models tend to be misused and perceived as deductive theory rather than as inductive guides for

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Osgood and Tannenbaum's (1955) Congruity model may be an exception to the above since it does add some degree of precision to attitude measurement and there is some agreement between their theoretical assertions and measurement techniques if one can accept the debateable assumption that their "semantic differential" technique is indeed an interval scale and that their bipolar criteria adequately describe an individual's cognitive space.

research. For instance, Festinger's Dissonance theory (1957), which is not a scientific theory at all, is a deceptively simple theoretical framework that can be stated in as few as nine propositions (Zajonc, 1968, pp. 360-361). However, it has had a tremendous impact on the attitude change literature. Its impact has been large because Festinger's original definition attempted to 'formulate a basic theoretical statement which would allow him to derive empirical hypotheses in particular situations (Zajonc, 1968, p. 360). In other words, dissonance theory was intended to provide a broad theoretical framework that would allow researchers to inductively make predictions within a variety of social situations. However, what has occurred is that specific dissonance hypotheses tend to be carried over across situations and not the broad theoretical framework. These deductive attempts to establish particular hypotheses across all situations have met with little empirical sucess.

Given the relative neglect of descriptive precision, it is little wonder that none of these theories are consistently accurate in predicting which mode of imbalance reduction will be used before the reduction occurs. Several insightful and ingenious explanations are offered after the fact, but post hoc explanations do not a scientific theory make. Rather, carefully derived predictions which can be falsified are at the heart of theory construction, not intuitive post hoc explanations, regardless of their elegance and sensitive insight.

Secondly, past theories on attitude change have implicitly assumed a direct causal link between attitudes and behavior even though this assumption has received little empirical support. The classic study by LaPiere (1934) and others actually contradict this causal linkage so that knowing how one responds on an ordinal scale provides little indication of how that person will behave in a given situation. Bem' Self-Perception Theory (1967, 1970) reverses this notion stating that one's behavior leads to one's attitudes but this does little to help our understanding of a complex process of attitude change. Since the attitude-behavior and behavior-attitude linkage have received inconsistent support, perhaps another conception of the process is necessary? Perhaps both attitudes and behavior are based on some other, heretofore

unspecified, variable or set of variables.

A third deficiency characteristic of these models is that they have consistently neglected the effects of significant others on the development of an individual's attitudes. Somehow an attitude has been formed, and the present concern is with how that attitude can be changed. This focus seems to imply that attitude change and attitude formation and development are different processes even though there appears to be no reason or support for that implication.

The typical research situation includes a pre-measure of the subject's attitude toward some issue, a message from some source that contradicts or is inconsistent with the subject's attitude, and a post-measure of the source's impact on the subject's attitude. The subject is pictured as a choicing system (although treated as a reactive, not active, organism) who will selectively include some sources and arguements and exclude others. The implied picture is one where the subject is an isolated individual impacted by a contradictory message who starts afresh, if you will, and instantaneously re-evaluates his own attitude, or the message advocated or the source of the contradictory message, or any combination thereof. On the basis of this re-evaluation, the subject will choose some means of restoring balance. Variables emphasized in this attitude change situation are characteristic of the source (credibility in particular), characteristics of the message (e g. one-sided vs two-sided messages, opinionated vs non-opinionated statements, amount and types of evidence used, amounts and types of emotional appeals used, etc.) and characteristics of the receiver (sex, age, level of self-esteem, dogmatism, authoritarianism, Machiavellianism, need for acheivement, need for affiliation, level of psychological stress or anxiety, etc.) In other words, qualities of the source and/or message and/or receiver as measured on an ordinal scale at a particular point in time are the variables used in trying to answer the question of when and why an individual will be persuaded or persuade himself.

This research emphasis implies that attitude change can be a one-shot affair if the source is credible enough and/or the message is of superior quality and disregards the mass of the subject's attitude and the number of

significant others who have talked to the subject about the particular issue. For instance, a given population expert, if credible enough and if skilled enough in message production and transmission should be able to change a forty year old Catholic's mind about birth control even though the Catholic has received a tremendous number of anti-birth control messages from others in his social environment. When stated like this, the assumption that a given message can cause change seems patently ridiculous even though this one-shot implication is inherent in much of the attitude research done to date.

In sum, prevailing attitude change theories have: a) neglected the interrelation between measurement and explanation and are thereby primarily post hoc explanations rather than scientific theories; b) conceived of man as an active rationalizing animal but have tried to study him as a reactive thing that will conform to simple deterministic laws; and, c) have neglected the importance of others in the formation and change of one's attitudes. Let us now turn to a discussion of a recent theory that attempts to correct these above deficiencies.

Linear Force Aggregation Theory

Recently a new theory of attitude change and development has been proposed by the sociologists Woelfel and Haller (1971). Their theory grew out of an interest in studying and predicting the educational and occupational aspirations of high school students. The theory is still in the process of being formulated and to date has been researched by only a handful of people. But its early predictive success, its interconnection between theory and measurement, and its inclusion of the effects of significant others indicate that it is worth further investigation.

Linear Force Aggregation Theory (LFAT) is basically an information theory with an attitude defined as "an individual's conception of relations to objects." (Woelfel and Haller, 1971, p. 76). An attitude, then, is conceived of as an information structure that is part of the individual's internal cognitive system. The informational structure is composed of relations between perceptual categories.

Following Bruner (1958), Woelfel and Haller assume that the perceptual process is primarily one of categorization, that an individual when perceiving an object classifies it according to some set of language labels. These linguistic categories render the continuous process of stimuli reception into discrete classes. The categorization process is essentially one of noting similarities and differences between objects in one's environment If this categorization process can be translated into mathematical judgements of differences between these discrete categories, then a precise descriptive matrix of differences (D) can be developed at any point of time to statically describe the individual's conceptual structure. Changes in this structure can be followed and measured over time by comparing changes in the difference matrices D_1, D_2,...D_n. This the authors do through their measurement technique called the Galileo system.

The Galileo scale ia a paired comparison technique which requires the respondent to state how different a given pair of concepts are perceived to be. The respondent is asked to express that perceived difference according to some standard set by the experimenter. Obviously, an equivalency would have a different score of 0. The respondent is told that x and y are u units apart He is then asked to use that difference as a standard and state his perceived difference between concepts a and b. Woelfel claims that this technique has several advantages.

> First and foremost, no restrictions are placed upon the respondent, who may report any positive real value whatever for any pair. Thus, the scale is unbounded at the high end and continuous across its entire range. Secondly, because the unit of measure is always the same (i.e. the unit is provided by the investigator in the conditional, " If x and y are u units part," and thus every scale unit is 1/u units), and because the condition of zero distance represents identity between concepts and is hence a true zero, not at all arbitrary, this scale is what social scientists usually call a ratio scale, which allows the full range of standard arithmetic operations. Third, since the unit of measure is provided by the experimenter it

> is possible to maintain the same unit of measure from one measurement to another, both across samples and across time periods, which is crucially important since time is one of the primitive variables of scientific theory. These three characteristics taken together provide the capacity for comparative and time-series analyses at very high levels of precision. (1974, p. 13)

This scaling technique does appear to produce a continuous, unbounded ratio scale and thus provide precise descriptions of informational structures and allows the use of elegant mathematical procedures. But, since the reliability of any measurement scale is partially dependent on the complexity of the judgemental task required of the respondent, the reader may well be wondering how reliable is this scale which provides so little structure.

For the individual case, this technique is unreliable. Barnett et al (1974, p. 14) report that typical test-retest reliability correlations range in the .70's for individuals . Actually, even this level of reliability is not as low as this reviewer would have estimated given the lack of scale structure and the complexity of the judgemental task. Partly, this unreliability must stem from the advantages claimed by Woelfel, i.e. the scale's unboudadness at the high end and the assumption that the unit of measure is always the same. It is doubtful that the standard is <u>perceived</u> similarly by each individual and/or by the same individual over time even though the same standard may be provided by the experimenter. However, if it can be assumed that these are essentially random sources of measurement error, then this technique should provide a reliable descriptive measure of a sample's averaged difference matrix, i.e. attitudinal structure. Indeed, this assumption can be made and the instrument's reliability over samples range in the .90's with sample sizes of 75. As is always the case, the reliability of this average difference matrix can be increased by increasing the size of the sample.

Another problem with this technique as applied to the individual respondent, is that the particular concepts to be judged are provided by the experimenter and not by the subject. Thus, what is measured is not the differences between the respondent's linguistic categories but the differences between

categories which the experimenter a priori assumes are part of the respondent's informational structure about the attitude in question. For instance, suppose we are interested in measuring people's attitudes toward the 1972 Presidential election as did Barnett et al (1974). The respondents' were asked to state how different each of the following concepts were from each other; Nixon, McGovern, Wallace, E. Kennedy, Agnew, Connally, Peace in Vietnam, Prosperity, Amnesty, Law and Order, Busing, Taxes, Demonstrations, Employment, Marijuana, Me. Even though these categories represent several concepts that might have been used by the respondents to perceive the 1972 Election, other concepts may also have been. For instance, the size of the federal budget, honesty, defense spending, integration, etc., may well be other judgements of similarity and difference made by an individual which make up his/her conceptual structure -- attitude -- toward any and all of the concepts of concern. None of these other comparisons are made even though they may be used by one or more of the respondents when perceiving a candidate. The Galileo technique for describing an individual's attitude could be made more valid, without loss of precision, for the individual case by having the respondent generate perceptual categories and/or make comparisons between those he/she claims he/she uses by choosing concepts from a provided list of possible categories.

This individuated list of comparisons would have several advantages . . For one thing, changes in an indivíual's attitude (informational structure) could be mapped over time by a) changes in difference estimates and b) changes in categories used to perceive the object in question. Both of these change scores would be useful data in assessing the affects of messages on an individual's attitude and thus increase the descriptive, predictive and explanatory power of the theory. Secondly, this individuated choice of comparison technique should increase the validity of the difference matrix so derived and thereby increase reliability. Thirdly, this suggested technique would let the respondent describe how he defines the situation which is badly needed in social science measures. Hare and Secord (1973), Reynolds, (1971), Krimmerman, (1969) and others have strongly argued that social scientists must start letting the subjects describe how they perceive the situation, rather than respond to the ex-

perimenter's a priori descriptive criterion, if we are to adequately predict, explain and come to understand human behavior. Fourthly, an average difference matrix could still be ascertained for the sample by averaging the differences reported between all concepts responded to by all subjects. Which concepts were compared by all the respondents could be an indicant of the consensual orient ation, and/or integration level within a collective (like a culture and/or sub-culture) as well as provide more accurate descriptions of how two or more collectives differ. Lastly, the development of such an individual measure would greatly increase the possible research uses of the Galileo instrument since the theoretical question in attitude research is often on individual changes in attitudinal structures and not just some collective's change.

Of course the extreme disadvantage of this individuated choice of comparisons technique is that it would increase tremendously the complexity of the respondent's judgemental task. Not only would he/she be asked to state differences on an unbounded scale, according to some standard, but he/she would also be required to state which concepts should be compared. This increase in complexity could very well decrease the scale's reliability and thereby nullify the very advantages which the proposed revision is intended to possess. Perhaps the best that can be expected is that respondents are asked to respond to what the experimenter deems relevant, rather than describe to the experimenter what the subject perceives as relevant about some object. Nonetheless, this suggestion seems worthy of investigation for the possibility of having a ratio measurement : (even of only adequate reliability) of how each individual perceives various objects in his/her environment would be very powerful indeed.

In sum, the LFAT starts with the assumption that the perceptual process is an active categorization of the differences between stimuli. (This assumption is at the heart of the multi-dimensional scaling procedures which provide more precise measures and allow for more complex and powerful statistical analyses, see Torgenson, 1958.) On the basis of this assumption, Woelfel and Haller developed the Galileo instrument which provides a ratio scale measure of perceived differences, i.e. of the relations between objects. Although highly precise and reliable

for sample sizes of 75 or more, this instrument does not provide a reliable measure of the changes in an individual's attitude over time and thus delimits the usefulness of the instrument to persuasion research. However, political, advertising, marketing and other studies interested in precise static descriptions and the plotting of over time changes in large groups' mean attitudes, would be well advised to use the Galileo instrument.

Theoretical Propositions:

The fundamental proposition of the Linear Force Aggregation Theory is considerably different than most models of attitude change and development. Rather than assuming that an individual selectively seeks some and filters out other sources of information, LFAT assumes that all messages received affect the individual's resultant attitude. Contrary to what Saltiel and Woelfel (1974, p. 2) assert this proposition does not negate or challenge the external part of the selective perception assumption which claims that men seek out and/or avoid certain types of information. It does, however, contradict the internal processing part of the selective perception notion. Rather than assuming, as most balance models do, that an individual reacts selectively to divergent expectations and information, Woelfel and Haller (1971) assert that an individual's attitude is formed out of all messages received about a paticular topic.. Specifically, an individual's attitude is defined as $\bar{X}=\frac{\sum x_i}{N}$. Where $\bar{X}$ = attitude

(1)

$\sum x_i$ = sum value of all messages about the topic received by the individual.

N = number of messages received about the topic from all sources.

It readily follows from this definition of attitude that the formula for attitude change would be

(2) $$\bar{X}_2 = \frac{\bar{X}_0 N_0 + \bar{X}_1 N_1}{N_0 + N_1}$$

Where $\bar{X}_2$ = the new attitude at t_1

$\bar{X}_0$ = the original attitude at t_0

$\bar{X}_1$ = the mean value of all messages received between $t_1 - t_0$

N_0=the number of messages out of which the original attitude was formed (mass).
N_1=the number of messages received about the topic during $t_1 - t_0$.

Even more interesting to the persuasion theorist and practitioner alike is the formula for the <u>amount of change in an attitude</u> after the receipt of new information.

(3) $\bar{X}_2 = \frac{N_1(\bar{A}-\bar{X}_0)}{1 + N_0}$ where $(\bar{A}-\bar{X}_0)$ = the amount of discrepancy between the mean position advocated by the new messages received during t_1 and t_0 and the original attitude.

Equation 3 specifies that there are three factors asserted to be causally related to attitude change in LFAT: a) N_0, or the number of messages out of which the original attitude was formed; b) N_1, or the number of new messages received between t_1 and t_0; and, c) $(\bar{A}-\bar{X}_0)$, or the amount of discrepancy between the new mean position advocated and the old attitude.

An Example:

For illustrative purposes, a simple example of the above formulas will be included. Let's assume that an individual has talked to five (5) people about whether and how often he/she should smoke cigarettes. Each of the five sources conveyed only one message to the individual and said that the person should smoke five (5) cigarettes a day. The predicted attitude for the individual would be to smoke five cigarettes a day, since $\Sigma x_i = 5 \times 5 = 25$, $N = 5$, and $25/5$ equals $5 - \bar{X}$.

Notice that the same prediction of 5 cigarettes a day would be made regardless of the homogeneity or hetereogeniety of the sources' messages as long as $\Sigma x_i = 25$ and $N = 5$. Let's again assume that the individual had received one message from five different sources about how much to smoke. The five sources proposed the following rates of smoking behavior:

Source	Proposed Rate of Behavior
A	0 per day
B	5 per day
C	15 per day
D	0 per day
E	5 per day
	$\Sigma x_i = 25$ and $\bar{X} = 5$

This prediction about the irrelevancy of the diversity of one's information sources' is unique to the Woelfel-Haller theory, and seriously downgrades the predictive and explanatory power of the personality variables purposed by Rokeach (1960) and Adorno (1950) to account for attitude change. The hypothesis that attitude change is independent of the homogeneity - hetereogeniety of one's information sources is supported by Saltiel and Woelfel's data (1974).

The individual in our example is now smoking 5 cigarettes a day. From a friend, he is told that he should smoke three packets a day. What is the predicted effect on the individual's attitude? According to formula #3 a precise prediction can be made; $\frac{1(60-5)}{6} = 9.17$ The individual's attitude, expressed as a rate of the behavior, would be increased by roughly 9 and he would now be expected to smoke 14 cigarettes a day. Notice that the larger the number of messages received from the friend the larger the cumulative effect on the individual s rate of smoking. This is an assumption every ad campaign has acted upon for quite sometime. On the other hand, if the friend's message would have been 5/day, no change would be predicted but the original attitude would have been made more stable due to the increase in N_0, i.e. a reinforcement effect. Lastly, if no new messages were received, the individual's attitude would be expected to continue unchanged. Although useful for mathematical purposes, this unchanging assumption seems unreasonable for long periods of time, given the entropic processes all organisms are subject to.

A quick analysis of the formula for attitude change implies that the resistance to change (i.e. the stability) of any attitude is wholly dependent on N_0-- the number of messages out of which the initial attitude was formed. The larger the mass (i.e. N_0) of the original attitude, the larger the number of messages divergent from $\bar{X}_0$ required to make

a noticeable behavioral change. This clearly suggests that one-shot attitude change situations are unlikely if the individual has previously received several messages about the attitude in question, but are likely if N_0 is small or equal to zero. This more parsimonious suggestion is consistent with the findings that the attitudes and beliefs more central to the individual's sense of identity are the most resistance to change; i.e. it seems reasonable to assume that the more central the attitude, the larger its mass, and, therefore, the more stable its structure. By asserting a causal relation between N_0 and attitudinal change, LFAT has redefined the attitude-behavior and behavior-attitude causality issue, and claims that both are a function of the amount of information received about a given issue. This prediction emphasizes a communication, as compared to a personality approach, to the study of attitude formation and change.

A second, not so obvious implication of the proposed relation between N_0 and attitude change, is that such variables as an individual's degree of satisfaction or dissatisfaction or the subjective certainty (to the extent these can be seperated from quantity of messages) of one's attitude are independent of the attitude's resistance to change. It doesn't matter if an individual likes or dislikes the attitude or believes strongly in its "correctness"; what does matter in determining stability is solely the size of N_0. Saltiel and Woelfel (1974) present evidence that the degree of satisfaction or dissatisfaction with one's attitude is indeed independent of the stability of the attitude. However, the degree of staisfaction, which was not related to N_0, was measured by two Likert-type questions and is, therefore, of questionable validity and precision.

Further, Woelfel and Saltiel's path analytic study supports the notion that the individual's overall, subjective stress level is independent of attitude stability. Their measure of stress is a 22-item Likert-type scale that does seem to be a reliable measure of an individual's overall level of psychological stress (Hough, 1969). However, an overall measure of stress is not the same thing as a decision-specific, temporary state of psychological discomfort claimed by the balance theorists to be a necessary condition for attitude change. Therefore, it cannot yet be concluded that some kind of psychological

tension is not a necessary ingredient for attitude change, even though the balance theorists, through inadequate measurement, have not established that it is necessary. Nonetheless, to the extent that one's overall stress level is related to the likelihood of experiencing decision-specific tension, then Saltiel and Woelfel's data do seriously challenge 'psychological discomfort' as a necessary ingredient for attitude change and downgrade its usefulness as a predictor of attitude change.

Saltiel and Woelfel (1974) report that the only significant coefficient with attitude change was the path stemming from the size of N_0, i.e. the number of messages out of which the original attitude was formed. Therefore, they conclude that the single best predictor of attitude change is the initial mass of the attitude. But, since they did not measure the amount of the new information received by the respondents between t_1 and t_0 (admittedly a difficult and expensive process), two principle components (i.e. X_1 and N_1) in their attitude change formula were not measured. Thus a direct test of LFAT's predictions was not made and the path comparison with other theoretical predictions are more suggestive than definitive. Nonetheless, the results of this study do strongly suggest that more parsimonious and precise descriptions of the attitude change process stem from LFAT, even though Saltiel and Woelfel have not clearly demonstrated LFAT's explanatory superiority over earlier conceptions.

Several other observations need to be made about their basic propositions. For one thing, the sources' of information are not weighted in any way. Each message is assumed to have an equivalent effect on the individual's attitude. Given no a priori reason for weighting various sources, in the absence of empirical justification, it seems reasonable to assume that all interpersonal messages are equally weighted by the receiving individual. But notice that the LFAT provides a way of weighting interpersonal sources. The relative significance of any given interpersonal source is weighted by the quantity of messages transmitted to an individual and not by some a priori quality of the observed messages and/or interpersonal relationship existing between the source and the individual. Although this quantity weighting may take some of the mystery out of interpersonal relations, it does seem to provide a description of the process whereby certain persons do become

significant or highly influential in shaping another's attitude. For example, parents may have more influence on their children than other people because they have conveyed more messages to the child and not because there is something "intrinsically influential" about the parent-child relationship; that something intrinsically significant becomes the number of messages conveyed.

Contrary to what the theory would predict and to the dismay of mass media advertisers, Woelfel et al (1974) and Woelfel and Hernandez (1970) found out that messages sent interpersonally have very substantial effects over attitudes, while messages sent via mass media generally have very tiny effect" (Woelfel and Saltiel, 1975, p. 7). Woelfel and Hernandez interpret this finding in terms of the perceived relevance of mass media messages as compared to interpersonal messages. Even though the quantity of messages received via mass media channels may be considerably larger than those from interpersonal sources, the force of these media inputs is not exerted directly on an individual's attitude and in some cases is nearly orthogonal to it. Put simply, mass media messages are just not perceived as relevant as are interpersonal messages, and the effect of their large mass may be readily counterbalanced by interpersonally received messages. Obviously, though, if no interpersonal messages have been received by the individual, then the relative impact of the mass media sources increases. This finding, though contradictory to LPAT, is consistent with Lazarfeld's (1944) results and Klapper's (1960) suggestions about the informing and reinforcing effects of mass media. Exactly how mass media messages are to be weighted has yet to be determined, but Woelfel and Hernandez (1972, p. 19) suggest some tentative weightings.

A second important observation about LPAT is their concern for accurate description. The focus on description interrelates the theoretical notions and the measurement techniques more accurately and allows for the derivation of precise predictions that can be falsified. As noted earlier, the lack of concern for the interrelation between explanation and measurement has been a serious shortcoming of previous attitude theories, of most social science theories for that matter. Explanation and a sense of understanding

(Reynolds, 1971) are the overriding goals of scientific theory which cannot be acheived unless precise descriptions and predictions can be generated. Woelfel and Haller's theory does focus on developing accurate descriptions and predictions, and that alone may make their theory more desireable and eventually more useful than previous attitude theories.

Related to this emphasis on description, is the desireability of defining an attitude as a rate of behavior rather than as some cognitive and/or evaluative and/or affective structure which is assumed to determine behavior. By making the dependent variable in attitude research changes in rates of behavior (a ratio scale), a more precise measure of message effects is developed. These ratio measures get us out of the use of debateable interval scales and allow for the use of more powerful statistical procedures.

The use of the Galileo instrument and the focus on the rates of behavior has lead to some rather impressive empirical results. McPhail (1971) was able to account for 77% of the variance in the rate of the participation in French seperatist political rallies and demonstrations. Woelfel and Hernandez (1972) and Mettlin (1973) were able to explain slightly more than 80% of the variance in the rate of the marijuana use and the rate of cigarette smoking respectively. These high amounts of variance explained are considerably greater than the typical amount found in most social science research. However, defining the dependent variable as a rate of behavior does limit the types of attitudes that can be studied.

Not all "conceptual relations between objects can be operationalized in terms of some rate of behavior. Some behavioral choices are inherently infrequent and dichotomous, like voting. Other attitudes of interest are not readily translateable into observeable behavior, i e. social values and religious beliefs. However, to the extent that a reliable description of a sample's attitudinal structure is provided by Woelfel and Haller's procedures, accurate predictions can be made about infrequent choice situations like voting. (The reader is referred to Barnett et al (1974) as an example of how these predictions can be ascertained.) Further, Saltiel and Woelfel (1974) demonsrated that their measurement

techniques can be used to study social values so that meaningful comparisons of averaged group attitudes can be made over time and across groups. However, researchers of the attitude change process more typically use the individual as the unit of change analysis and not the group. In these situations, Woelfel and Haller's procedures are inapplicable. The use of the rates of behavior as our dependent variable, though, should be encouraged and strived for whenever appropriate since this clarifies our analysis, allows for more powerful statistical procedures and directly connects theoretical predictions with observable behavior.

Finally, LFAT takes as given that an individual's behavior and attitudes is partially determined by the expectations and information transmitted to him/her by others. These authors assert, simply enough, that there are two primary sources of information; other persons and our own self-reflexive activity. Structural factors are considered to be controlling parameters on who interacts with an individual and what is discussed, but are not considered to be causally related to the formation and change of attitudes. These structural factors include such things as geographical location, level of education, age, sex, marital status, social prestige ratings, father's occupational level, etc. and are more typically referred to as demographic data.

"Significant Others" are those who "exercise major influence over the attitudes of others"(Woelfel and Haller, p. 75) and are thought to be attitude specific.* In other words, ministers may be significant on one's attitudes on religion but irrelevant for one's attitudes on marijuana and drug abuse; teachers may be significant on one's attitudes about reading and literature but irrelevant to one's attitudes to Vietnam; etc. A person's attitudes, then, are considered to be influenced by particualr others and the identity of these others will shift according to what specific attitude is being measured.

*
This is not a tautology since the significance of any given source can be measured by the quantity of information transmitted to the individual.

Significant others can be identified for each individual by using the Wisconsin Significant Other Battery (Haller and Woelfel, 1969; 1971) or a variant thereof. The battery simply asks the individual to state with whom and how often he/she has talked about the particular topic. In this way, each test individual specifies who his/her particular significant others are for the attitude of concern. These significant others are then contacted and asked to fill out a similar questionnaire so that their relative influence and the predicted attitude of the individual can be determined.

It is interesting to note that the identifying question does not ask who has influenced him/her the most, or who he/she likes the best, or the credibility of the source named, but focuses singularly on identifying who the individual has talked with about the topic in question. Since the concern of LFAT is with quantity and not quality this procedure seems theoretically consistent. Furthermore, Saltiel and Woelfel (1974) present evidence that the subjective certainty of the significant others' attitude is independent of the effect of their messages on the individual. i.e. strength of the significant other's attitude is irrelevant. However, Woelfel and Haller do not identify how the individual himself feels he should weight the significance of the other's incoming messages. By excluding this data, analyses of a possible interaction between quality of messages and quantity of messages and the significance of self-reflexive activity in shaping and forming one's attitude are avoided.

The second primary source of information is stated to be our own reflexive thinking about the topic. But what triggers, stimulates, encourages an individual to think, to self-reflect about his own stance on the topic? Isn't it reasonable to assume that at least some triggers to thought age the expected credibility of the source and/or related to the type (i.e. quality) of message transmitted? This reviewer, at least, believes that perceived characteristics of the source and/or message and/or relationship with the source do serve this triggering function and the importance of their effect on self-reflexive activity should be studied. However, no study using the LFAT and the Galileo technique has reported how often the individual has reflected on the

topic of interest. In my opinion, this is a serious oversight in testing the propositions of the theory. Such a question as How often have you thought about your relationship with Topic X?' should be included along with the significant other identification question. Granted, however, the responses to such a self-report question would be difficult to make in a precise manner and would be of questionable validity because of the difficulty of remembering how often one has thought about Topic X. At best, these responses could only indicate the frequency of recent conscious reflection which disregards all those times one unconsciously thinks and/or dreams about a particular issue.

Nonetheless, if such a self-reflexive frequency index could be reliably created, the relative importance of one's own activities in shaping one's attitudes could be identified and compared with the effects of significant others. It would be my guess that we are not nearly as self-determined as we like to think we are, but to disregard our own influences on ourselves is to negate our symbolic abilities, the very thing that makes us human. This is a serious mistake which is contradictory to Woelfel and Haller's assumptions about the perceptual process and inconsistent with what social scientists must do if we are to explain and come to understand human behavior.

Secondly, such a self-reflexive frequency measure would provide a bridge between the discrete measures of quality of messages, interpersonal relationships, personality characteristics and the quantity of messages received. Such a bridge is of particular interest to the communication scholar in his efforts to explain human behavior in terms of message characteristics.

Summary

There are several characteristics of Woelfel & Haller's (1971) Linear Force Aggregation Theory which recommend its use to persuasion researchers. It is primarily a descriptive theory that interrelates theoretical propositions with measurement techniques, and thereby allows for the generation of precise predictions that can be falsified. Emphases on description and prediction are the necessary and crucial first steps in the formulation of explanatory social theory which have been consistently disregarded by previous

theories of attitude change. The highly inferential and empirically unjustified assumption that attitudes cause behavior (or that behavior cause attitudes) across all situations is re-defined in LFAT so that both are a function of the amount of information received about a particular topic. Re-defining the attitude-behavior and/or behavior-attitude causality issue in this manner, makes their approach a communication perspective on the development and change of attitudes. Thirdly, Woelfel and Haller take as axiomatic that significant others effect an individual's attitudinal structure and must be included in an adequate theory of attitude change. Again, the inclusion of the effects of others alleviates a serious deficiency in previous theoretical models. For the above reasons and especially because the theory can be falsified so that researchers can demonstrate what is known and not known, its use is strongly recommended where appropriate.

Linear Force Aggregation Theory seems best suited to over-time analyses of changes in the attitudinal structures of groups. Since the measurement techniques are not reliable for the individual case, studies which focus on changes in individual's attitudes should not use the Galileo instrument. However, researchers that are interested in studying shifts in the positions of groups and making over-time between groups, would be well-advised to use the Woelfel and Haller model of attitude change.

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