SOURCE OF EVALUATIONS REFORMULATED AND ANALYZED

I. RICHARD SAVAGE
CENTER FOR ADVANCED STUDY IN THE BEHAVIORAL SCIENCES
and
MURRAY WEBSTER, JR.
THE JOHNS HOPKINS UNIVERSITY

1. Introduction

Webster [8] has published a theory of the source of evaluations and expectations for performance (which we will henceforth refer to as the *source theory*), along with results of experiments intended to test derivations from the theory. The empirical results were interpreted as being in accord with the derivations, and thus, as supportive of the theory. Study of the theory and the *derivations* indicates there are logical problems with the assumptions, and that as a result, the derivations are *not* logical consequences of the assumptions. Therefore, the results of the experiments are indeterminate with respect to the theory Webster presented.

We begin the analysis with a description of the substantive ideas of the source theory, along with the original statement of the theory. Next, we present a simple formalization of the theory, using ideas from probability theory to restate the propositions.

The source theory is strengthened, qualitative inequalities on probabilities of being influenced are replaced by expressions with estimatible parameters.

2. The source theory

The source theory was an attempt to state explicitly some ideas deriving from two theoretical traditions. The first, which might be called the *looking glass self*, derives from the Cooley [5] and Mead [6] ideas regarding the individual's sources of selfconcept. According to this tradition, the individual's ideas regarding himself, including particularly his selfevaluation, come from the opinions of others. Moreover, these others are not all expected to be equally important in

The research of I. R. Savage was done while a Senior Post Doctoral Fellow of the National Science Foundation and with the assistance of the Army, Navy and Air Force under Office of Naval Research Contract number N00014-67-A-0235-0006. Current address is Florida State University, Department of Statistics, Tallahassee, Florida.

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determining the selfevaluation. Evaluations from a *significant other*, to use Sullivan's term [7], are predicted to be accepted by the individual, while opinions from other people (of unspecified characteristics) are likely to be ignored. Incorporation of these ideas into Webster's theory involved both an explicit statement of the idea that one's own ideas regarding himself come from others, and an explicit statement that what makes an other a significant other is the belief that the other possess high ability at whatever task is being performed and evaluated.

The second theoretical tradition is that of expectation theory, deriving from the work of Joseph Berger and associates [1], [2], [3]. According to this tradition, many regularly reported observable behaviors among the members of problem solving groups, such as unequal number of chances to perform, evaluations of performances, likelihood of performing, and rejection of influence, may be explained if one postulates the existence of *expectation states*, or cognitive beliefs about the ability of each member of the group. The construct *expectation state* was used in the source theory as being roughly equivalent to selfevaluation, though with some slight—and for our purposes, unimportant—differences. The source theory and the derivations are given in Charts I and II. Combining the looking glass self tradition and expectation theory yields such assertions as: an

CHART I

THE ORIGINAL VERSION OF THE THEORY
(taken from Webster, 1969)

Definition 1. A situation is a *task situation* S if and only if it contains:
(a) at least two actors p and o making performance outputs;
(b) an actor E making unit evaluations of those performance outputs;
(c) no previous expectations held by p and o of their own or each other's abilities at the task;
(d) task orientation of all actors;
(e) collective orientation of all actors.

Definition 2. E is a *source* for p in task situation S if and only if p believes that E is more capable of evaluating performances than p is.

Assumption 1. In task situation S, if E is a source for p, then p will agree with E's unit evaluations of any actor's performance.

Assumption 2. In task situation S, if p evaluates a series of performances of any actor, then he will come to hold an expectation state for that actor which is in accord with those evaluations.

Assumption 3. In task situation S, if p holds high expectations for any actor o_1, then as compared to a second actor o_2 for whom p holds low expectations:
(a) p will give o_1 more action opportunities than o_2;
(b) p will be more likely to evaluate positively the future performance outputs of o_1 than those of o_2;
(c) in case of disagreement between o_1 and o_2, p will be more likely to agree with o_1;
(d) p will be more likely to accept o_1 than o_2 as a source.

Assumption 4. In task situation S, if an actor p_1 holds high expectations for himself and low for o, then as compared to a second actor p_2 who holds low expectations for himself and high for o:
(a) p_1 will be more likely to accept a given action opportunity and make a performance output;
(b) in case of disagreement with o, p_2 will be more likely to accept influence than p_1.

CHART II

THE ORIGINAL DERIVATIONS
(taken from Webster, 1969)

Derivation 1. In case of disagreement with *o*, the probability of *p* accepting influence is less in the $HE(+\ -)$ case than in the $HE(-\ +)$ case.
Derivation 2. In case of disagreement with *o*, the probability of *p* accepting influence is less in the $LE(+\ -)$ case than in the $LE(-\ +)$ case.
Derivation 3. In case of disagreement with *o*, the probability of *p* accepting influence is less in the $HE(+\ -)$ case than in the $LE(+\ -)$ case.
Derivation 4. In case of disagreement with *o*, the probability of *p* accepting influence is *greater* in the $HE(-\ +)$ case than in the $LE(-\ +)$ case.
Derivation 5. In case of disagreement between *p* and *o*, the probabilities of *p* accepting influence will be in the following order: $HE(-\ +) > LE(-\ +) > LE(+\ -) > HE(+\ -)$.

individual who is evaluated by a high ability evaluator (the *HE* in Chart II) will often believe him and form an expectation state based on those evaluations, while an individual evaluated by a low ability evaluator (the *LE* in Chart II) will usually ignore him; and an individual who holds high selfexpectations (the $(+\ -)$ conditions in Chart II) will be more likely to reject influence than an individual who holds low selfexpectations (the $(-\ +)$ conditions in Chart II).

Although the source theory is quite abstract and formal, the presentation does not allow a precise analysis of how the derivations follow from the theory. The primary objective of this paper is to formalize the theory so that the method of deduction of the derivations will be explicit. The resulting formalization also may have other advantages, such as: (1) giving an alternative view of the source theory, (2) showing places where it might be desirable to modify the source theory, and (3) helping to generalize the source theory to make it useful in new experimental conditions.

The derivations in Chart II were tested in a two phase experiment with four conditions. Subjects were told that the study was concerned with measuring their ability to judge which of a pair of patterns contained more white area. The patterns resemble very complex checkerboards, and all contain exactly 50 per cent white area; thus, there is no objective basis upon which to judge the answer. More important for the theory, extensive pretesting has established that the empirical probability of choosing either alternative is close to 0.50. This means that there is no subjective basis for evaluating choices as correct in the situation, except for the communicated opinions of another individual, the potential *source of evaluations*. Subjects are requested to do the best job they possibly can at judging the patterns, in the attempt to produce the *task orientation* condition (Definition 1(d) in Chart I). Experience with related experiments has shown that these instructions are generally successful at inducing task orientation.

In all conditions, pairs of subjects received evaluations of their performances from an evaluator—the potential *source*—in phase I. In phase II each pair of subjects worked on a second set of problems, and they were instructed to come to a joint, or *team* decision about them. This is the *collective orientation* of Definition 1(e) in Chart I. Initial choice disagreements were experimentally introduced, and subjects restudied each slide before making a private final decision. The proportion of times that subjects changed their own initial choices under disagreement—the *acceptance of influence* in the derivations—was computed as the main statistic for testing the theory. The observed ordering of experimental conditions by this statistic, $HE(- +) > LE(- +) > LE(+ -) > HE(+ -)$, was the same as that stated in the derivations. The following analysis will be confined to derivations relating directly to this particular experiment.

3. Parametric formalization

The following notation will be needed:

(i) *universal event:* Ω; in the following each event is a subset of Ω;
(ii) *experimental conditions:* H_-, H_+, L_-, L_+;
(iii) *performer accepts source:* A;
(iv) *performer's expectation state:* E_-, $E_=$, E_+;
(v) *performer disagrees:* D;
(vi) *performer accepts influence:* I.

All probabilities will be written in the form $P\{M|N\}$, unless it is clear that $N = \Omega$, in which case we write $P\{M\}$. Whenever $P\{M|N\}$ appears, either we should verify that $P\{N\} > 0$, or that the term is explicitly multiplied by 0. In statements of assumptions and theorems (Sections 4 and 5), all probabilities which appear are implicitly assumed to have been defined properly.

The assumptions of the parametric theory follow.

ASSUMPTION 3.1. *Assume*

$$P\{E_=|\bar{A}\} = 1, \tag{3.1}$$

where, generally, $\bar{N}$ *is the complement of* N. *Assume*

$$P\{E_+|AH_+\} = P\{E_+|AL_+\} = 1 \tag{3.2}$$

and

$$P\{E_-|AH_-\} = P\{E_-|AL_-\} = 1. \tag{3.3}$$

ASSUMPTION 3.2. *Assume*

$$P\{A|H_+\} = P\{A|H_-\}, \tag{3.4}$$

and let H *denote the common probability of accepting* H_+ *or* H_- *as a source. Assume*

$$P\{A|L_+\} = P\{A|L_-\}, \tag{3.5}$$

and let L *denote the common probability of accepting* L_+ *or* L_- *as a source. Assume*

$$0 \leqq L < H \leqq 1. \tag{3.6}$$

ASSUMPTION 3.3. *If* M *can be specified in terms of* A, H_+, H_-, L_+, L_-, E_+, $E_=$, E_- *and without the use of* I *or* D, *then the value of* $P\{D|M\}$ *does not depend on* M.

ASSUMPTION 3.4. *Assume*

$$(3.7) \quad P\{I|DE_{=}H_{+}\} = P\{I|DE_{=}H_{-}\} = P\{I|DE_{=}L_{+}\} = P\{I|DE_{=}L_{-}\}$$

and denote the common value by R. Assume

$$(3.8) \quad P\{I|DH_{+}E_{+}\} = P\{I|DL_{+}E_{+}\}$$

and denote the common value by E. Assume

$$(3.9) \quad P\{I|DH_{-}E_{-}\} = P\{I|DL_{-}E_{-}\}$$

and denote the common value by e. And finally, assume

$$(3.10) \quad 0 \leqq E < R < e \leqq 1.$$

This completes the description of the theory, or as we will often say, the *model*. It appears incomplete in that terms like $P(D|\bar{I})$ have never been mentioned, but they have no substantive interpretation in the experiment and will never be mentioned in the derivations. Also there is no term for the performer's evaluation by source, since in the theory and the experiment the evaluations either were ignored (and consequently irrelevant) or they were equivalent to performer's expectation state for self (iv).

The source theory speaks of a situation containing at least three actors, *p*, *o*, and *E*. Two of these, *p* and *o*, both perform and evaluate; *E* only evaluates. However in the experiment, *p* and *o* never actually interact, and *E* is not even an actor (a tape recorded voice was used). Thus, the theory, when applied to the experimental situation, refers to one human being who is always present, and consequently, there is no need specifically to include symbols for individuals in the notation.

The source theory contains some appearances of a dynamic model, especially in Assumption 2 of Chart I. However, the dynamics appear relatively unimportant to the main theoretical interest in the source. In any case, there is no discussion of the acceptance *process*, and the data of the experiment are collected after the active introduction of all the theoretical variables. The dynamic aspects do not appear in the probability version.

There is also at least one elaboration: the case $E_{=}$ was excluded from consideration in the source theory. For the probability analysis, its inclusion was necessary for making some of the derivations.

Typically, if $P\{N\} > 0$, then we must make assumptions about $P\{M|N\}$. Thus, contrast (3.1) with Definition 1(c) of Chart I. In the theory, *no previous expectations* apparently was intended to mean that there are two states E_{+} and E_{-} such that $\Omega = E_{+} + E_{-}$ and no assumption is made about $P\{E_{+}|\bar{A}\}$. We now interpret no previous expectation as meaning there are three disjoint states, $E_{=}$, E_{-}, E_{+} such that $\Omega = E_{-} + E_{+} + E_{=}$ and $P\{E_{+}|\bar{A}\} = P\{E_{-}|\bar{A}\} = 1 - P\{E_{=}|\bar{A}\} = 0$. Since the theory does not exclude the possibility of $\bar{A}$ at the time data are collected and we cannot directly tell if a person is A or $\bar{A}$, we make assumptions for the $\bar{A}$ case as well as the A case.

Finally, this analysis is somewhat more complicated than the minimal statement necessary for our purposes. In the interests of preserving comparability to the source theory, variables unnecessary to this analysis were introduced which had an uninteresting probability structure; for example, $AH_+ \rightarrow E_+$, $AH_- \rightarrow E_-$, $AL_+ \rightarrow E_+$, $AL_- \rightarrow E_-$, $\bar{A} \rightarrow E_=$, where $N \rightarrow M$ means $P\{M|N\} = 1$. If (3.8) and (3.9) had been expanded in terms of H_+, H_-, L_+, L_- instead of E_+, E_-, the analysis would be easier. On the other hand, the theory might be enriched if (3.2) and (3.3) were weakened to $P\{E_+|AH_+\} = P\{E_+|AL_+\}$ and $P\{E_-|AH_-\} = P\{E_-|AL_-\}$. To do this one must check to see what other changes would be appropriate to modify the proofs of Section 5, and see what experimental evidence or arrangements could discriminate between (3.2) and (3.3) and their modification.

The E of Definition 1(c) of Chart I fixes the experimental conditions as described in (ii). Definitions 1(d) and 1(e) are not explicitly used in the source theory and are not incorporated into the probability formalization. Formulas (3.1) and (3.7) express the idea that the experimental conditions have no effect without acceptance, and formulas (3.2), (3.3) and (3.10) show the effects of acceptance; this captures Definition 2 of Chart I.

Assumptions and formulas of Chart I are paired with those presented in this section as follows.

Assumptions 1 and 2 of Chart I are paired with (3.2) and (3.3) and the last sentence in the paragraph following (3.10).

Assumption 3(d) of Chart I is paired with (3.4), (3.5), and (3.6).

Assumption 4(b) is paired with (3.8), (3.9), and (3.10).

Assumptions 3(a), 3(b), 3(c), and 4(a) are not relevant to the current theory and the experiment.

A critical new assumption in the model is the intermediate value R, the common value of (3.7). This assumption was not implicit in the source theory. Although the theorem of Section 5 can be proved without the full strength of (3.7), (3.8), and (3.9), the intermediate value property (3.10) is essential (see Note 6.1).

4. Probability theory

The following are some standard results needed later:

$$(4.1)\quad 0 \leqq P\{M|N\} \leqq 1, \qquad P\{N|N\} = 1, \qquad P\{M|N\} + P\{\bar{M}|N\} = 1;$$

$$\begin{aligned}(4.2)\quad P\{M_1M_2|N\} &\leqq \min\,[P\{M_1|N\}, P\{M_2|N\}]\\ &\leqq \max\,[P\{M_1|N\}, P\{M_2|N\}]\\ &\leqq P\{M_1 \text{ or } M_2|N\}\\ &= P\{M_1|N\} + P\{M_2|N\} - P\{M_1M_2|N\}\\ &\leqq P\{M_1|N\} + P\{M_2|N\};\end{aligned}$$

$$(4.3)\quad P\{M_1M_2|N\} = P\{M_1|N\}\, P\{M_2|NM_1\};$$

$$(4.4)\quad P\{M|N\} = P\{MQ|N\} + P\{M\bar{Q}|N\}.$$

The next results are elementary but not standard.

LEMMA 4.1. *If* $P\{M|N_1\} = 1$, *then* $P\{M|N_1N_2\} = 1$. *If* $P\{M|N_1\} = 0$, *then* $P\{M|N_1N_2\} = 0$.

PROOF. We prove the second of these equivalent statements: $P\{M|N_1\} = 0$ implies $P\{MN_1\} = 0$, which implies $P\{MN_1N_2\} = 0$, which implies the conclusion $P\{M|N_1N_2\} = 0$.

LEMMA 4.2. *If* $P\{N_2|N_1\bar{N}_3\} = 0$, *then* $P\{M|N_1N_2\} = P\{M|N_1N_2N_3\}$.

PROOF. The following computation yields the desired result:

$$(4.5) \qquad P\{M|N_1N_2\} = \frac{P\{MN_1N_2\}}{P\{N_1N_2\}}$$

$$= \frac{P\{MN_1N_2N_3\} + P\{MN_1N_2\bar{N}_3\}}{P\{N_1N_2N_3\} + P\{N_1N_2\bar{N}_3\}}$$

$$= \frac{P\{MN_1N_2N_3\}}{P\{N_1N_2N_3\}} = P\{M|N_1N_2N_3\}.$$

LEMMA 4.3. *Let* Γ *be a collection of events. Assume* $P\{D|Q\} = p$ *for each* $Q \in \Gamma$, *then* $P\{M|N\} = P\{M|DN\}$ *if* MN *and* N *are in* Γ.

PROOF. We compute

$$(4.6) \qquad P\{M|DN\} = \frac{P\{DMN\}}{P\{DN\}} = \frac{P\{MN\}\,P\{D|MN\}}{P\{N\}\,P\{D|N\}}$$

$$= \frac{P\{MN\}}{P\{N\}} = P\{M|N\}.$$

5. Derivation of the source theory

For later reference, we introduce some additional notation and give the basic experimental results from Webster ([8], Table 1):

$$(5.1) \qquad a = P\{I|DH_+\} = 0.20;$$

$$(5.2) \qquad b = P\{I|DH_-\} = 0.52;$$

$$(5.3) \qquad c = P\{I|DL_+\} = 0.35;$$

$$(5.4) \qquad d = P\{I|DL_-\} = 0.42.$$

Theorem 5.1, below, will be proved at the end of this section.

THEOREM 5.1. *With the assumptions and notation of Section 3:*

$$(5.5) \qquad a = R + H(E - R);$$

$$(5.6) \qquad b = R + H(e - R);$$

$$(5.7) \qquad c = R + L(E - R);$$

and

$$(5.8) \qquad d = R + L(e - R).$$

Corollary 5.1, below, is equivalent to the derivations of Webster [8].

COROLLARY 5.1. *With the assumptions and notation of Section 3:*

$$b > d; \tag{5.9}$$

$$d > c; \tag{5.10}$$

and

$$c > a. \tag{5.11}$$

PROOF. From (5.6) and (5.8), inequality (5.9) is equivalent to the inequality $R + H(e - R) > R + L(e - R)$, which is equivalent to $(H - L)(e - R) > 0$, which is true since $H - L > 0$ from (3.6) and $e - R > 0$ from (3.10).

From (5.8) and (5.7), inequality (5.10) is equivalent to $R + L(e - R) > R + L(E - R)$, which is equivalent to the assumed $e > E$ from (3.10).

From (5.7) and (5.5), inequality (5.11) is equivalent to $R + L(E - R) > R + H(E - R)$, which is equivalent to $(L - H)(E - R) > 0$, which is true since $L - H < 0$ from (3.6) and $E - R < 0$ from (3.10). *Q.E.D.*

NOTE 5.1. The empirical values (5.1) through (5.4) agree with Webster's derivations (5.9) through (5.11). Each of those relative frequencies is based on 20 trials involving between 18 and 20 subjects. An examination of Webster's unpublished data indicates a component of variance between individuals for H_- and L_- conditions. We will not, however, consider the statistical analysis of this data. We will work with the relative frequencies in (5.1) through (5.4) as if they were parameter values.

COROLLARY 5.2. *With the assumptions and notations of Section 3:*

$$R = \frac{ad - bc}{a + d - b - c}; \tag{5.12}$$

$$H = \frac{L(a - R)}{c - R}; \tag{5.13}$$

$$E - R = \frac{c - R}{L}; \tag{5.14}$$

$$e - R = \frac{d - R}{L}; \tag{5.15}$$

$$c < R < d; \tag{5.16}$$

$$1 < \frac{a - R}{c - R}; \tag{5.17}$$

and

$$\max\left[0, \frac{R - c}{R}, \frac{d - R}{1 - R}\right] < L < \frac{c - R}{a - R}. \tag{5.18}$$

PROOF. Verify (5.12) by using the formulas in Theorem 5.1. The other results readily follow.

NOTE 5.2. The model contains five parameters, H, L, E, R, e and four equations (5.5) through (5.8), so that we cannot evaluate the parameters even if the numerical values in (5.1) through (5.4) were free of sampling errors. However, various inequalities, such as (5.16), (5.17), and (5.18), must be satisfied. From (5.1) through (5.4) we obtain $R = 0.392$ and $21/196 < L < 42/192$. In particular, if we assign the value of 0.15 to L, we find $H = 0.69$, $E = 0.112$, and $e = 0.579$.

Now we present the proof of Theorem 5.1.

PROOF OF THEOREM 5.1. The four parts of the theorem are proved in the same manner, and thus, we shall show only the proof of $P\{I|DH_+\} = R + H(E - R)$, which is equivalent to (5.5). We begin with the identity

$$P\{I|DH_+\} = A_+ + A_- + A_= + \bar{A}_+ + \bar{A}_- + \bar{A}_=, \tag{5.19}$$

where $A_+ = P\{IAE_+|DH_+\}$, $A_- = P\{IAE_-|DH_+\}$, $A_= = P\{IAE_=|DH_+\}$, $\bar{A}_+ = P\{I\bar{A}E_+|DH_+\}$, $\bar{A}_- = P\{I\bar{A}E_-|DH_+\}$, $\bar{A}_= = P\{I\bar{A}E_=|DH_+\}$.

Now (3.1) implies $P\{E_+|\bar{A}\} = P\{E_-|\bar{A}\} = 0$. Then Lemma 4.1 implies $\bar{A}_+ = \bar{A}_- = 0$. Also (3.2) implies $P\{E_-|AH_+\} = P\{E_=|AH_+\} = 0$, so that $A_- = A_= = 0$. Now we have

$$P\{I|DH_+\} = A_+ + \bar{A}_=. \tag{5.20}$$

We compute

$$\bar{A}_= = P\{I\bar{A}E_=|DH_+\} = P\{\bar{A}|DH_+\}\, P\{E_=|DH_+\bar{A}\}\, P\{I|DH_+\bar{A}E_=\}, \tag{5.21}$$

where we have used (4.3) several times. By using Lemma 4.3 and equation (3.4), we obtain

$$P\{\bar{A}|DH_+\} = P\{\bar{A}|H_+\} = 1 - H. \tag{5.22}$$

By using Lemma 4.2, we have $P\{E_=|DH_+\bar{A}\} = P\{E_=|H_+\bar{A}\}$. Now with (3.1) and Lemma 4.1, we obtain $P\{E_=|H_+\bar{A}\} = P\{E_=|\bar{A}\} = 1$ or

$$P\{E_=|DH_+\bar{A}\} = 1. \tag{5.23}$$

Next we obtain

$$P\{I|DH_+\bar{A}E_=\} = P\{I|DH_+E_=\} = R, \tag{5.24}$$

by using Lemma 4.2 with $M = I$, $N_1 = DH_+$, $N_2 = E_=$, $N_3 = \bar{A}$, and $P\{N_2|N_1\bar{N}_3\} = 0$ from (3.2) and Lemma 4.1; also (3.7) is used. Combining (5.22), (5.23) and (5.24) in (5.21) yields

$$\bar{A}_= = R(1 - H). \tag{5.25}$$

We compute

$$A_+ = P\{IAE_+|DH_+\} = P\{A|DH_+\}\, P\{E_+|DH_+A\}\, P\{I|DH_+AE_+\}. \tag{5.26}$$

From Lemma 4.3 and equation (3.4), we obtain

$$P\{A|DH_+\} = H. \tag{5.27}$$

From Lemma 4.2 and equation (3.2), we obtain

$$P\{E_+|DH_+A\} = 1. \tag{5.28}$$

Next, we obtain

$$P\{I|DH_+AE_+\} = P\{I|DH_+E_+\} = E, \tag{5.29}$$

by using Lemma 4.2 with $M = I$, $N_1 = DH_+$, $N_2 = E_+$, $N_3 = A$, and $P\{N_2|N_1\bar{N}_3\} = 0$ from (3.1) and Lemma 4.1; also (3.8) is used. Combining (5.27), (5.28) and (5.29) in (5.26) yields

$$A_+ = HE. \tag{5.30}$$

Finally, using (5.25) and (5.30) in (5.20) yields

$$a = P\{I|DH_+\} = HE + (1 - H)R = R + H(E - R). \qquad Q.E.D. \tag{5.31}$$

6. Additional notes

NOTE 6.1. In reading Webster [8], a possible value of R appears to be 0. Then instead of (5.11), we obtain

$$\begin{aligned} P\{I|DH_+\} &= HE \\ &> LE = P\{I|DL_+\}. \end{aligned} \tag{6.1}$$

And if $R = 1$, we obtain

$$\begin{aligned} P\{I|DL_-\} &= 1 + L(e - 1) \\ &> 1 + H(e - 1) = P\{I|DH_-\}. \end{aligned} \tag{6.2}$$

These counter intuitive results bolster our assumption that the probability of being influenced prior to accepting a source should be intermediate between the extreme probabilities that will prevail after a source is accepted (3.10).

NOTE 6.2. The present theory (Section 3) has the following advantages when compared to the source theory of Webster [8]:

(1) the theory is complete in the sense that the desired conclusions are derived by standard logical methods;

(2) the theory is simple and appears not to have unnecessary assumptions;

(3) the theory generates quantitative results (numerical parameters) instead of only qualitative results (ordinal inequalities);

(4) the theory is explicit and hence easily discussed.

NOTE 6.3. The theory (Section 3) is fragmentary. It would be important to extend the theory to cover other experimental situations. The extensions should preserve the good properties mentioned in Note 6.2. Modest extensions would include more than two of each of the following: (1) types of sources; (2) types of evaluations or expectation states; and (3) individuals in the task group.

NOTE 6.4. It would be desirable to develop statistical theory for the estimation of the parameters. The theory will become more binding when the number of equations is at least as large as the number of parameters.

NOTE 6.5. The theory (Section 3) is not the only *type* of model which could be constructed for this particular experimental situation. It is basically an information processing model, and assumes that the observable behavior, which we call $P\{I|D\}$ is a function of the subject's judgment of the accuracy of his own initial choice. Another sort of model, one based upon exchange ideas, has been constructed by Camilleri and Berger [4], and assumes that the observable behavior is determined by the subject's desire to avoid losses in selfesteem and approval from others. We do not wish to comment here upon the relative merits of exchange and information processing models for this experiment; we merely note that we have chosen to deal with only one of many possible approaches to the situation.

NOTE 6.6. The assumption $P\{E_+|AL_-\} > 0$ (contrary to (3.3)) corresponds to the subject accepting the source but "believing" either the source is dishonest in his evaluations or that the source is more likely wrong than correct. The realization of this assumption is plausible and future experiments might explore its consequences.

NOTE 6.7. The extension of this theory to include the acceptance process and other dynamic aspects would increase the mathematical interest and be of substantive value.

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