

## Lay Epistemo-Logic—Process and Contents: Another Look at Attribution Theory

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A theory of the lay epistemic process is outlined. According to this theory knowledge-seeking behavior is initiated by a purpose that a person has for reaching a given inference and consists of the stages of problem formulation and of problem resolution, the latter stage being governed by the principle of logical consistency. Major attributional formulations are interpreted within the lay epistemic framework. It is concluded that such formulations have typically addressed particular instances of epistemic (inferential) behavior rather than the underlying epistemic process. In this sense, the attributional formulations may be considered special cases of the present model applied to specific contents of knowledge. The present lay epistemic paradigm thus provides an integrative framework that allows us to consider diverse attributional models in common theoretical terms and to derive the necessary applicability conditions of different such models.

The present article features a theory of the process of knowledge acquisition that provides an integrative paradigm for major attributional models proposed in recent years by social psychologists (e.g., Jones & Davis, 1965; Kelley, 1967, 1971, 1972; Weiner et al., 1971). In what follows, the theory is first set forth. Subsequently, central attributional notions are reinterpreted in present theoretical terms. It is suggested that different attributional formulations address different contents of knowledge but share the same epistemic process explicated herein. Thus the present analysis reduces numerous disparate notions in the field of attribution to a few underlying constructs in which terms human epistemic behavior may be understood.

### A Theory of Lay Epistemology<sup>1</sup>

#### *The Epistemic Process*

##### *Problem Formulation*

The present theory deals with the way in which individuals go about acquiring knowl-

edge of themselves and the surrounding world. Knowledge-seeking behavior is assumed to follow a certain general sequence. This is presently referred to as the epistemic process. Essentially, the epistemic process is assumed to consist of two major stages: the stage of problem formulation and that of problem resolution. The epistemic problem is conceived of as a set of mutually exclusive propositions whose validity a knower might wish to assess. Henceforth, I call those the problem's constitutive propositions. Obviously, only one among mutually exclusive propositions may be valid. The proposition finally adjudged as valid would be the problem's resolution, that is, a new knowledge or inference on some topic. For example, a knower might wonder whether a given event (say, Paul's enjoyment of a movie) was exclusively caused by (a) the movie's unique properties, (b) Paul's unique personality, or (c) Paul's modality of interaction with the movie (e.g., viewing it on TV). A resolution of the problem in favor of one of these propositions would constitute a causal inference that the knower may reach.

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<sup>1</sup> Conceptual precursors to the ideas elaborated herein may be found in Kruglanski, Hamel, Maides, and Schwartz (1978), and in Kruglanski and Bar-Tal (Note 1).

Not all epistemic problems refer to *causal* questions. Thus, one might formulate a problem regarding the direction in which a given spot might lie (to the right, the left, or directly ahead), the time at which a given occurrence took place (at 7:00 or 7:15 p.m.), and, in general, problems concerned with all possible types of propositions including those about one's self (cf. Bem, 1972).

It is noted in passing that within the present framework the somewhat formal term *proposition* refers to the content of a thought, a belief, or a feeling. (For a similar usage, see McGuire, 1968.) For example, we may mean roughly the same thing when we say that John *thinks* he is in love, *believes* that he is, or *feels* that way. In all three cases the reference is to the content of the same proposition. The notion that feelings may be conceived of as inferences similar in kind to other thoughts or beliefs was stressed in the pioneering work of Schachter and Singer (1962) and was developed further by Nisbett and Valins (1971).

In formulating the epistemic problem, the individual is assumed to draw on his/her store of available knowledge to generate plausible alternative propositions on some topic. Various psychological processes may play a part at this stage, in particular long- and short-term memory, momentary saliences of stimuli, and the knower's attentions. Although undoubtedly important, those various processes are outside the scope of the present work and will not be dealt with further. What will be stressed, however, is that the formulation of an epistemic problem may be understood as a *motivated* behavior, prompted by an interest that a knower may have in a given bit of knowledge. Such interest could be intrinsic such as when a child, out of sheer curiosity, attempts to divine the workings of a TV set. Alternatively, the interest could be extrinsic such as that of a traveler seeking to find out what time it is in order to catch a plane.

It follows that the epistemic problem formulated by the knower has to be *teleologically functional*<sup>2</sup>; that is, the knower assumes that the problem's resolution will serve some (intrinsic or extrinsic) end of importance to this individual. Data relevant to the foregoing

proposition were reported by Kruglanski, Hamel, Maides, and Schwartz (1978). Subjects in an experiment were presented with one of two different objectives and were asked to state which of two epistemic problems they preferred to resolve. The problems were so constructed that one appeared to advance (was teleologically relevant to) one of the objectives, and the second, the remaining objective. For example, some subjects were presented with the objective of deciding "whether to invite John to a Saturday-night party," and others were presented with the objective of deciding "whether it is worthwhile to buy tickets to a given movie for oneself and a friend." All subjects then stated their choice between obtaining a resolution to (a) the problem of whether John's decision to attend a movie on Saturday night was caused *by his unique personality* or *by the movie's properties* (i.e., a problem cast in the "person"- "stimulus" categories of Kelley's, 1967, analysis of variance) and (b) the problem of whether John's decision to attend the movie was an *end in itself* or a *means* of combatting loneliness (categories reminiscent of Kruglanski's, 1975, endogenous-exogenous framework).

Note that the person-stimulus problem is teleologically functional to the objective of deciding about the movie tickets, for if John's acquisition thereof had been prompted by the movie's attractive properties (stimulus attribution), the film might be worth viewing by oneself as well. On the other hand, the means-end problem is teleologically functional to the objective of deciding about the party invitation, for if John's contemplated visit to the movies were a mere means of combatting loneliness, he might well attend the party in-

<sup>2</sup> Note that the present notion of teleological *functionality* is unrelated to the issue of teleological explanation and its place in naive epistemology. (For a recent debate of the latter issue, see Buss, 1979; Harvey & Tucker, 1979; and Kruglanski, 1979.) As presently defined, teleological functionality refers to the relation between the epistemic problem and the knower's end. It is independent of the type of epistemic problem being dealt with, for example, composed of teleological or causal propositions, and so on.

stead. The results of the experiment lend strong support to the notion of teleological functionality. Across diverse hypothetical situations subjects exhibited significant and consistent preference for resolutions to teleologically functional versus nonfunctional problems, that is, to problems whose resolutions appeared to advance the subjects' experimentally induced objectives.

Later it will be shown that distinct attributional formulations address distinct epistemic problems. The foregoing discussion suggests, therefore, that any given formulation should apply to an individual's epistemic activities *only when* the problem addressed by the formulation is teleologically functional to this person.

### *Problem Resolution*

Consider a person who, for some reason, formulated the epistemic problem of whether the coffee he/she just drank at a dinner party was Brazilian or Colombian. One way of finding this out might be to ask the hostess and trust her reply. If she asserted that the coffee was Brazilian, the problem would be resolved in favor of the Brazilian hypothesis and vice versa if she asserted it to be Colombian. This simple instance of inference is now treated as prototypical in the following probe of the underlying logic employed in the resolution of all epistemic problems. First note that the knower likely considers the hostess's report as *relevant* to the problem at hand. Given the knower's subjective world of meanings and concepts (shared to a large extent by other members of the same cultural community), the hostess's report seems to bear on the problem in some direct way, whereas other information (say, the weather report) may not appear to have such a bearing. That people process information in accordance with its relevance to their intuitive hypotheses and theories has been recently stressed by Ajzen (1977) and has been an important theme in the works of Asch (1946), Heider (1958), and Kelly (1970).

But the knower in our example is likely to view the hostess's report not only as vaguely relevant to the two alternative hypotheses

being evaluated but also as *consistent* with one such hypothesis and *inconsistent* with the other. For example, if the hostess asserted that the coffee was Brazilian, this is consistent with the Brazilian hypothesis and inconsistent with the Colombian hypothesis. Therefore, the hostess's report may assist our knower in deciding in favor of the former and against the latter hypothesis. We may thus summarize by saying that in resolving the epistemic problem, the knower deduces implications from the alternative propositions as he/she intuitively understands them and seeks evidence relevant to, that is, consistent or inconsistent with, those implications.

A further theoretical point must now be made. In our example evidence consistent with a given proposition assisted the knower in problem resolution. But not all consistent evidence is likely to be of such assistance. In particular, evidence may at the same time be consistent with several alternative propositions and thus furnish a poor basis for discriminating among them. For example, the symptoms of arousal and insomnia would be consistent both with having drunk Brazilian and Colombian coffee. Evidence regarding such symptoms is likely to be of little help to our knower, precisely because it does not discriminate among the competing propositions that he/she may have formulated. By contrast, the hostess's aforementioned assertion that the coffee was Brazilian would be consistent with the Brazilian hypothesis and at the same time inconsistent with the Colombian one. We can say that this assertion is *noncommonly deducible* from (or implied by) the two competing hypotheses considered by the knower and so it sets them apart. Let us now define more formally some of the central notions employed in the above analysis, in particular the notions of *relevance*, *consistency*, and *noncommon deducibility*.

*Definition 1. Two cognitive elements are mutually relevant if and only if either is believed to entail the other, or the negation of the other. By entailment is presently meant the "if-then" relation. For example, one might surmise that if "it is five o'clock," then "a reliable watch would indicate five"; this would render mutually relevant the two cog-*

nitions just considered. On the other hand, the "five o'clock" cognition may be believed not to entail anything in particular about the weather conditions in Malta, so the cognitions "it is five o'clock" and "it is raining in Malta" would be irrelevant to each other.

*Definition 2a. Two relevant propositions are consistent if and only if their conjunction is compatible with (i.e., is not negated by) their relevance relation.* Thus, if it being 5:00 p.m. entails that a good watch would indicate this, the cognitions "it is five o'clock" and "a reliable watch is indicating five" are mutually consistent.

*Definition 2b. Two mutually relevant propositions are inconsistent if and only if the negation of their conjunction is entailed by their relevance relation.* Thus, if it being five o'clock entails that "a good watch would not indicate a quarter of six," the propositions "it is five o'clock" and "a good watch is indicating a quarter of six" would be inconsistent.

This discussion suggests that propositions are tested by examining their consistency or inconsistency with evidence. An item of evidence is useful to the extent that it distinguishes between alternative propositions or is noncommonly deducible therefrom as defined next.

*Definition 3. An implication is noncommonly deducible<sup>3</sup> from a set of propositions if the state of affairs it affirms is consistent with some of the propositions and inconsistent with the remaining propositions.* By contrast, a *commonly deducible* implication is one that affirms a state of affairs consistent with *all* the alternative propositions. As we have seen in the earlier example, a commonly deducible implication is not of much use to a person attempting to choose among competing propositions.

Earlier it was suggested that the epistemic problem formulated by the knower is likely to be *teleologically functional*; that is, the problem's resolution would be hoped to contribute to the knower's ends in some way. We may now identify yet another functionality requirement, this time to be met by evidence in which a knower would be interested. Such evidence would have to be *validationally functional*; that is, it would have to be adjudged

as contributing to the resolution of the epistemic problem by being noncommonly deducible from the problem's constitutive propositions.

### *Noncommon Deducibility and Diverse Contents of Knowledge*

The noncommon deducibility logic is conceived of as an aspect of the epistemic process applicable to all types of knowledge regardless of contents. Let us illustrate the working of this logic in reference to propositions whose content is causal and noncausal, respectively. Turning first to the validation of causal propositions, consider a tennis player attempting to decide whether the effective corner shot that he/she just executed is causally attributable to a correct flip of the wrist or to the bending of the knees. Now one implication of the concept of causality (as intuitively grasped by most people) is covariation of the cause and the effect. In our example, covariation of the effective shot with wrist flipping would, therefore, be consistent with the proposition that flipping was the shot's cause and inconsistent with the proposition that knee bending was the exclusive cause. Thus, the covariation just mentioned is noncommonly deducible from the alternative propositions considered by our knower and may well facilitate a choice among them.

Remaining with causal propositions, note that covariation evidence need not be synonymous with noncommon deducibility. Let us revisit our scientifically minded tennis player attempting now to resolve a new problem, notably whether the wrist flipping caused, versus was caused by, the well-executed stroke

<sup>3</sup> Similarity should be noted between the present notion of noncommon deducibility and the Bayesian notion of diagnosticity (Ajzen & Fishbein, 1975). According to the latter notion, a datum is diagnostic of a hypothesis to the extent that its occurrence is more strongly entailed by this hypothesis than by the hypothesis's negation. This is called the "likelihood ratio" and is the ratio of the conditional probabilities  $P(D/H)$  (probability of datum D under hypothesis H) and  $P(D/\bar{H})$  (probability of D under the negation of H). In other words, a datum would be diagnostic to the extent that it was noncommonly deducible from the H and the not H hypotheses.

just accomplished. In this particular case covariation (of the stroke with wrist flipping) would be consistent with both alternative propositions among which choice is desired. In present terms, such covariation would be commonly deducible from these propositions. Hence, such evidence would not afford the basis for deciding among the propositions. In the case at hand, one may well resort to evidence regarding the temporal order of flip versus the stroke. This would be noncommonly deducible from the alternative propositions being dealt with: Priority of the flip is consistent with the flip's causality and inconsistent with the stroke's causality and vice versa.

So far, we have seen how a knower may use the noncommon deducibility logic with propositions whose content is causal. In some cases this particular logic may lead to interest in covariation evidence, whereas in other cases (as in the preceding example) the noncommon deducibility logic would not implicate an interest in covariation. No particular interest in covariation is expected either, when the epistemic problem involves a choice among noncausal propositions. Covariation is implied by the notion of causality (as understood by most individuals), but is not so implied by numerous alternative notions in which a knower might be interested. Thus when interested in deciding whether "A caused X" or "B caused X," one might indeed look for a possible covariation of A or B with X. However, when attempting to decide whether A is "taller or shorter" than X, or whether X is "in love" with A or with B, one is not likely to be interested in the covariation (conjunctive presence-absence of A or B with X), but rather in evidence noncommonly deducible from contents of the particular noncausal propositions among which a choice is desired, notably, propositions asserting the "taller" versus "shorter than" relation, or the "in love" with A versus "in love" with B relation. For example, the "taller than" concept may imply to most people a higher reading to be yielded by a measuring rod; the "in love" relation may imply to some people a dreamy expression, a loss of appetite, and so on.

The foregoing analysis suggests that noncommonly deducible evidence would be of greater value to a knower than (a) evidence irrelevant to the alternative propositions being chosen from or (b) evidence that is commonly deducible from those propositions. Data bearing on those derivations were reported by Kruglanski, Hamel, Maides, and Schwartz (1978). In one experimental study, subjects were presented with one of two epistemic problems concerning the causal explanation of an event. In one case the problem was whether the "person" or the "stimulus" was the cause of some event (as in Kelley, 1967; McArthur, 1972). In the second case the problem was alternatively (a) whether the event was an end in itself or a means to another end (as in Kruglanski, 1975), (b) whether it was caused by the actor's ability or effort (as in Weiner et al., 1971), or (c) whether it was intentional or unintentional (as in Weiner, 1974).

In each case, the subject was required to state which of two sets of information was more useful in resolving the person's problem. One set contained information regarding the presence or absence of covariation of the effect with the person and with the stimulus. This information was noncommonly deducible from the person-stimulus problem; for example, contained data consistent with the proposition that the person was the cause of the effect and inconsistent with the proposition that the stimulus was the cause of the effect. This informational set was largely irrelevant to the alternative epistemic problems (based on the means-end, ability-effort, or intentionality-unintentionality categories). On the other hand, the second informational set was noncommonly deducible from the alternative epistemic problem given to the person and was largely irrelevant to (i.e., nondeducible from) the person-stimulus problem. A manipulation check verified that the subjects perceived the appropriate covariational set as significantly more relevant to the person-stimulus versus the alternative problem and the alternative set as more relevant to the latter versus the former problem.

For example, one event presented to subjects was that "John laughed at the come-

dian." Subjects given the person-stimulus problem were asked to decide whether "something about John probably caused him to laugh at the comedian" or "something about the comedian probably caused John to laugh at him." Other subjects were given the "means-end" problem constructed around the same event. They were asked to decide, for example, whether "something about the comedian's jokes probably caused John to laugh at him" or "something about the comedian's high status caused John to laugh." In each case the subjects were required to choose among two sets of information according to their ability for resolving the epistemic problem. One set (noncommonly deducible from the person-stimulus problem) might have been that "almost everyone who hears the comedian laughs at him," implying high consensus, that is, low covariation between the *specific* person (John) and the laughing response and that "John hardly ever laughs at any other comedian," implying high covariation between the specific stimulus and the response. The second set (noncommonly deducible from the means-ends categories) might have been that "John does not usually enjoy humor," "the comedian is John's supervisor at work," and "John is afraid of losing his job." Across a variety of problems and informational patterns, subjects significantly rated as more useful the noncommonly deducible as opposed to the nondeducible (or irrelevant) information.

Another pertinent experiment tested the idea that noncommonly deducible evidence would also be preferred over evidence that is commonly deducible from the problem's constitutive propositions. Subjects were presented with information about different events and about the causal ascriptions of those events by attributors. In one condition (M for modality), additional knowledge was injected that modality of the attributor's interaction with the event might have biased this person's causal attribution. In another condition (P, for person), the additional information was that the attributor had a vested interest in the attribution rendered, thus casting doubt on his/her objectivity. In the third condition (T for time), it was implied that the attribu-

tion was rendered on a particularly disruptive occasion so that this historical factor may have biased the attribution.

Thus, in the M, P, and T conditions of this research, the respective categories of modality, person, and time provided the basis for rival alternatives to the proposition that the attribution presented to the subject was arrived at in an unbiased way. More specifically, in Condition M the subject's epistemic problem was to decide whether the attribution was (a) unbiased versus (b) biased by a faulty interactional modality; in the P condition the decision was between a versus c, possible bias due to the attributor's personal circumstances, and in Condition T, between Proposition a and d, of possible bias due to time-contingent factors.

In each condition the subjects replied to specific questions that inquired whether before accepting the attribution it would be desirable to have additional information regarding (a) consensus in the form of attribution made by another person, (b) consistency across modalities in the form of attribution reached via a different modality, or (c) consistency across times in the form of attribution reached on a different occasion. Note that an answer to each of the above questions is noncommonly deducible from *one* of the epistemic problems constructed about a given event (e.g., the problem in the M condition), whereas answers to the remaining questions are commonly deducible from this epistemic problem. Thus, evidence about consistency across modalities is noncommonly deducible from the epistemic problem in the M condition in which the knower's choice is between believing that the attribution was unbiased and being biased due to a faulty modality. Specifically, constancy of the effect across modalities is consistent with the hypothesis of unbiased attribution and inconsistent with the hypothesis of defective modality. Hence, this pattern of data should augment the knower's confidence in the former as opposed to the latter hypothesis. By contrast, evidence about consensus, for example (consistency across persons), is commonly deducible from the problem's constitutive propositions in the M condition: If the attribution is unbiased,

various competent attributors should be commonly capable of arriving at it. But also if the interactional modality is defective, then various competent attributors should be similarly misled and should consensually arrive at an incorrect attribution. A similar case can be made for the common deducibility status of consistency across times with regard to the M and P problems, and for the idea that in the P and T conditions, consensus and temporal consistency, respectively, are noncommonly deducible and the remaining evidence types are commonly deducible from the corresponding problems.

The results of the study just described lend strong support to the present theory. In each experimental condition (and across diverse hypothetical events), the subjects expressed significantly greater interest in noncommonly versus commonly deducible information. Thus, in the M condition, interest in consistency across modalities significantly exceeded interest in the remaining information. In the P condition, interest in consensus information significantly exceeded interest in the remaining criteria, and in the T condition interest in consistency across time exceeded interest in the remaining criteria (with marginal significance). To summarize, experimental evidence suggests that when faced with a given epistemic problem, the knower attaches greater value to (or has a greater interest in) noncommonly deducible evidence as opposed to evidence that is commonly deducible or non-deducible from the alternative propositions that he/she may be considering.

### *Availability*

According to the foregoing discussion, only epistemic contents (i.e., particular propositions and evidence types) that are teleologically or validationally functional would figure in an epistemic episode. But considerations of functionality set only a loose constraint on contents dealt with by the knower. Thus, a person could generate a large variety of epistemic problems that are all teleologically relevant to this knower's end. For instance, someone whose end may be to purchase a car may wonder about (a) the way

to the nearest dealership, (b) the comparative advantages and disadvantages of the various models, and (c) the corresponding price ranges. Furthermore, granting a specific epistemic problem, the knower may seek evidence for different, noncommonly deducible (hence, validationally functional) implications of the problem's constitutive propositions. For instance, an individual who wishes to ascertain whether the way to the grocery store lies to the left or to the right might variously seek evidence for the following noncommonly deducible implications of the "left" and "right" hypotheses: (a) If the way actually lay to the left (or to the right), a policeman would attest to this; (b) a map would indicate this; (c) pursuing the left (or the right) path would actually lead to the destination, and so on.

*Momentary availability* may determine which among the teleologically functional problems and the validationally functional information would actually be addressed by the person. By "availability" is meant the ease with which a given cognitive content comes to mind, that is, the ease with which it is readily conceptualized or retrieved at a given moment (Kahneman & Tversky, 1973; Tversky & Kahneman, 1974). This should depend on a highly particularistic array of factors, such as the repertory of concepts that a given individual has learned in the course of a lifetime, the frequency with which a given content element has been recently employed in similar circumstances, or the saliency of such content elements in the situation.

To conclude this portion of the article, let us recapitulate the central notions of the present epistemic theory. It is assumed that the sequence of epistemic activities can be subdivided according to the stages of problem formulation and of problem resolution. It is proposed that an epistemic problem gets formulated in accordance with the knower's purpose for acquiring a given bit of knowledge. The epistemic problem is conceived of as a set of alternative propositions in whose contents the knower happens to be interested. Those contents could include self-knowledge (e.g., regarding one's attitudes, feelings, or properties) as well as knowledge about other

persons, objects, and events. In the course of problem resolution, the knower is assumed to (a) deduce from the alternative propositions (as he/she understood them) implications that might differentiate among them, (b) seek evidence regarding those implications, and (c) come to feel greater confidence in propositions consistent with the evidence and lesser confidence in those inconsistent with the evidence. Contents of the propositions invoked by a knower and of implications deduced from those propositions are assumed to depend on their situational functionality and availability. The invoked contents would have to be considered by the knower as functional to his/her situational objectives and to be available or mentally accessible to this individual at the given moment.

In the following sections the theoretical notions just reviewed are applied to major formulations in the field of attribution. In particular, an attempt is made to show how the present framework provides an integrative conceptual scheme whereby diverse attributional conceptions may be analyzed.

#### *Attribution Theory: A Lay Epistemic Interpretation*

The following reinterpretation of attributional formulations in present theoretical language stresses two major proposals. According to one proposal, different attributional formulations address the contents of different epistemic problems. If so, it follows from the present notion of teleological functionality that a given attributional formulation will apply to an individual's epistemic activities only when the particular problem it encapsulates is functional to this person's situational objective. According to the second proposal, the diverse attributional criteria assumed to determine the knower's confidence in specific inferences represent, at root, the logic of noncommon deducibility. This particular argument implies further that (a) a given attributional criterion will have the predicted impact on confidence only when the knower's epistemic problem renders the criterion a noncommonly deducible bit of information, and (b) the notion of noncommon

deducibility is the generative principle whereby one can derive the particular attributional criteria mentioned in the literature so far and also other functionally equivalent criteria.

#### *Problem Differences Among Attributional Models*

A brief review of major attributional formulations will suffice to demonstrate that they indeed address distinct epistemic problems. In Kelley's (1967) analysis of variance (ANOVA) formulation, the attributor's problem is to determine whether some effect was caused solely by (a) the external entity, (b) the person (his/her unique properties), (c) the interactional modality, (d) the "time" at which the interaction occurred.<sup>4</sup> Somewhat different problems figure in the several causal schemata and attributional principles that the layman was assumed to employ in lieu of the full fledged ANOVA (Kelley, 1971, 1972). For example, the *person-entity* schema concerns the problem of determining whether an effect was caused by (a) the actor's personal properties or (b) the entity's properties responded to similarly by people in general. This is a narrower problem than contained in the ANOVA cube, as the latter also includes the additional possibilities that the effect was caused by the modality or the time. In the *multiple-necessary-cause* schema (Kelley, 1972), the attributor assumes that several causal factors were indispensable for an effect's occurrence. This may be interpreted as a specific resolution to the problem of deciding whether, alternatively, only a single factor may have been indispensable. In this particular case the epistemic problem concerns the number of causal factors (one vs. several) rather than the specific nature of such factors (as in the person-entity case). This hardly alters the status of the necessary-causes schema as a resolution to a specific epistemic

<sup>4</sup> Actually, Kelley's (1967) ANOVA matrix allows the additional possibility that some particular combination of entity and/or person, time, or modality was the cause of the effect. For simplicity's sake, however, this possibility will be disregarded throughout the present article.



problem in which a knower may be sometimes interested. The *pairing and grouping schemata* (Kelley, 1972, p. 15) concern, respectively, symmetry in social relations and transitivity as well as symmetry in such relations. From the present perspective both schemata refer to specific propositions about social relations that could figure in some knower's epistemic problems. In the Jones and Davis (1965) model of correspondent inferences, the perceiver's epistemic problem is to determine whether or not a given act was prompted by a "correspondent" attribute in which correspondence (a) is defined in terms of the extent to which "the act and the underlying characteristic are similarly describable by the inference" (Jones & Davis, 1965, p. 223) and (b) is assumed to increase "as the judged value of the attribute departs from the judge's conception of the average person's standing on that attribute" (p. 224).

An attributional model proposed by Weiner and his associates (Weiner et al., 1971) addressed the problem of deciding whether a success or a failure was prompted by one or more of "ability," "effort," "task difficulty," and "luck." Finally, Kruglanski (1975) discussed the case in which the layman's epistemic problem is to decide whether a voluntary action was an end in itself (representing an endogenous attribution) or a means to a further end (representing an exogenous attribution).

Although not exhaustive, the foregoing review demonstrates that the various attributional models differ in the particular epistemic problems they feature. The formulations considered thus far concern causal or explanatory problems, but other attributional analyses address noncausal inferences, for example, those about responsibility or freedom (e.g., Harvey, 1976; Shaw & Sulzer, 1964).

That attribution-theoretic models have addressed distinct epistemic problems may not, in and of itself, seem surprising. Yet the broader, metatheoretic import of this has typically gone unattended. Note that people are competent to generate vast numbers of epistemic problems classifiable in a vast number of ways. The problem ensconced, say, in Kelley's (1967) ANOVA formulation may be

considered merely one among a large number of possible causal problems, and so with problems of Jones and Davis (1965), Kruglanski (1975), or Weiner et al. (1971).

Thus, someone interested in explaining an act need not be interested in whether the act followed from a given "correspondent" attribute. For instance, a person might merely wish to identify the actor's momentary intention without wondering about its further linkage with a stable trait. Similarly, a knower interested in the actor's intention need not formulate an endogenous-exogenous problem, but might wonder instead which of two equally exogenous intentions has brought the act about. A knower attempting to account for a performance outcome (a success or a failure) need not phrase a problem in terms of the categories of "ability," "effort," "luck," and "difficulty," but instead might wish to know whether a success was prompted by "diligent preparation," "cheating," "the teacher's favoritism," and what not.

Granting the potentially vast number of epistemic problems, the extant collection of attributional formulations could be regarded as a vanishingly small sample of possible such models differing in the particular problems they address. Thus it becomes of some importance to determine whether the problems in current attributional models may claim a special significance for the layman versus constituting a more or less arbitrary collection of no unique distinction. The attributional analyses so far have not attempted to justify their choice of epistemic problems. On reflection, however, any such attempt would seem a priori bound for failure. Any epistemic problem could be of interest to someone in some circumstances, and the extent to which it is recurrent or pervasive might vary widely with the particular life vicissitudes of persons or groups.

Thus, there seems at least reasonable room to doubt whether the epistemic problems contained in the attributional formulations deserve special attention. But if they do not, focal attributional constructs as, say, the "ANOVA cube," "correspondent inferences," the "endogenous-exogenous partition," and the "ability, luck, effort, and difficulty" cat-

egories, all demonstrably reduced now to the specifics of epistemic problems, might have to abdicate their theoretical centrality. They might come to be regarded as a mere sample of lay notions, of equal potential significance for the knower to the multitude of alternative concepts in most individuals' repertoires.

Finally, insofar as distinct attributional formulations address distinct epistemic problems, the present theory suggests under what conditions any given such formulation may not represent the individual's knowledge-seeking activities. This property follows directly from the notion of teleological functionality whereby the epistemic problem (addressed by a given attributional formulation) would *not* be tackled by a knower unless its potential resolution was assumed to advance this person's situational objectives. Thus, in the research referred to earlier (Kruglanski, Hamel, Maides, & Schwartz, 1978), subjects expressed a preference for a resolution to the person-stimulus problem (reminiscent of Kelley's, 1972, person-entity schema) only when such a resolution was made functional to the subjects' experimentally induced objectives, and the same was true for alternative epistemic problems modeled after alternative attributional formulations (e.g., the end-means or ability-effort problems modeled after Kruglanski, 1975, and Weiner et al., 1971, respectively).

#### *Attributional Criteria and Noncommon Deducibility*

If distinct attributional formulations address different epistemic problems, it follows from the present analysis that the types of evidence that may be used toward the resolution of such problems should also differ. Such evidence should be noncommonly deducible from the alternative propositions making up the problem in each case. Accordingly, the following review attempts to demonstrate that the various attributional criteria featured in the various formulations may indeed be interpreted as noncommonly deducible implications of problems featured in the respective formulations.

*Kelley's (1967) criteria for external attribution.* According to Kelley (1967), a confident causal attribution of effect to external entity would be rendered if the following four criteria were satisfied

- (1) *Distinctiveness*: The impression is attributed to the thing if it uniquely occurs when the thing is present and does not occur in its absence; (2) *Consistency over time*: Each time the thing is present, the individual's reaction must be the same or nearly so; (3) *Consistency over modality*: His reaction must be consistent even though his mode of interaction with this thing varies; (4) *Consensus*: Attributes of external origin are experienced the same way by all observers. (p. 197)

Let us see now in what sense the foregoing evidential pattern is noncommonly deducible from the epistemic problem addressed by Kelley's (1967) model. As we have seen this is the problem of determining whether the effect was caused exclusively by (a) the external entity, (b) the person interacting with the entity, (c) the modality of the interaction, or (d) the time at which the interaction took place.

It should first be noted that distinctiveness of an effect with regard to external entity is *consistent* with the hypothesis that the external entity was the cause of the effect; distinctiveness or conjunctive presence or absence is implied by the causality concept as commonly understood. One implication of the proposition that in a given situation A was the cause of B is that under those circumstances the removal of A would eliminate B as well (conjunctive absence), whereas an introduction of A would lead to the appearance of B (conjunctive presence).

Further, it should be noted that constancy of the effect (e.g., across people, times, or modalities) may be conceived of as the absence of distinctiveness. To say that an effect is constant *across persons*, for example, means that it is present even though the *specific person* is absent, thus violating the conjunctive presence/absence criterion of distinctiveness. Therefore, constancies across persons, modalities, and times may refute the implications that the effect was distinctive with regard to the specific person, modality, or time. Insofar as distinctiveness is implied by the

causality notion, the above constancies are inconsistent with the propositions that the specific person, modality, or time was the cause of the effect.

Thus the evidential "package" identified by Kelley (1967) and including distinctiveness of the effect with respect to external entity and constancy of effect across persons, modalities, and times is consistent with one of the alternative propositions implicit in Kelley's cube (that regarding entity causation) and is inconsistent with other such propositions (regarding causation due to person, modality, or time).<sup>5</sup> In present terms the foregoing evidential pattern is, therefore, noncommonly deducible from the alternative propositions suggested by Kelley's model.

Although it is true that Kelley's (1967) criteria can be viewed as noncommonly deducible from the alternative propositions implied by the ANOVA cube, application of the noncommon deducibility notion to those particular propositions does not necessarily yield those particular criteria, but could yield other criteria as well. For example, in addition to the property of conjunctive presence-absence of cause and effect, the notion of causality is commonly taken to imply the temporal precedence of the former over the latter. Accordingly, an evidential pattern whereby some effect was preceded by an entity, but, in turn, preceded the particular person, modality, and time would be consistent with entity causation hypotheses and inconsistent with the person, modality, or time causation hypotheses. This also would be noncommonly deducible from the epistemic problem represented by Kelley's cube.

Finally, the notion of noncommon deducibility highlights the idea that Kelley's (1967) criteria for entity attribution may only apply when the epistemic problem contains *all four* of the possibilities suggested by Kelley's model, notably that the effect may have been caused by the (a) entity, (b) person, (c) modality, or (d) time. But consider now a more restricted problem in which the knower has generated only two (instead of four) of those alternative propositions, say, that the effect was caused by (a) the specific person or (b) the environmental entity. In

such a case, consistency over times and modalities would be of little use to the knower because it is commonly rather than noncommonly deducible from the alternative propositions at stake. Thus, if the person were the cause, the effect should appear consistently across occasions in which the specific individual was present. But also, if the external entity were the cause, consistency over times should be expected granting the entity's presence at those times. Thus, consistency over times, for example, may not differentiate among the person and the entity hypotheses. It lacks noncommon deducibility from those two propositions, and hence it should not affect the confidence of someone attempting to choose among them. The very same argument can be made for the common deducibility status of consistency-across-modalities criterion as far as the person-entity problem is concerned. In sum, when the knower's problem is to decide whether the person or the entity was cause of the effect, the criteria for entity attribution would not encompass the entire set of four propositions mentioned by Kelley (1967), but would be limited to the two noncommonly deducible ones, in this case distinctiveness of the effect with respect to the entity and constancy of the effect across persons (i.e., consensus).

*The covariation principle.* The criteria for external attribution (Kelley, 1967) were intimately tied to specific causal categories: The distinctiveness outcome was reserved for the entities category, and the constancy outcome, for the times, modalities, and persons categories. However, in a subsequent article, Kelley (1971) articulated the distinctiveness-consistency rule in terms relatively uncommitted to specific categories. This was labeled

<sup>5</sup> Strictly speaking, the "attributional criteria" proposed by Kelley (1967) (i.e., distinctiveness of the effect with respect to the entity and constancy of the effect across persons, times, and modalities) are compatible with the idea that *some combination* of entity, person, modality, and the time has caused the effect, as well as with the idea that *only the entity* has caused the effect: In ANOVA terms, the appearance of only one *main* effect (analogous to the distinctiveness outcome) in a multivariate matrix does not preclude the additional existence of interaction effects.

the *covariation principle*, whereby "an effect is attributed to the one of its possible causes with which, over time, its covaries" (Kelley, 1971, p. 3). Strictly speaking, covariation denotes distinctiveness or conjunctive presence/absence of entity and effect across numerous times. In the present terminology, covariation is noncommonly deducible from the propositions that (a) the particular entity (x) was the effect's sole cause and, (b) the particular time (t) played a causal role in the effect's appearance: Covariation across times is consistent with the first proposition and inconsistent with the second.

In the preceding example, covariation was noncommonly deducible from the knower's epistemic problem. But it is reiterated that the noncommon deducibility rule may lead to implications other than covariation. Even granting the same epistemic problem of deciding whether entity x or time t was the cause of the effect, one could employ the noncommon deducibility notion to generate a criterion other than covariation, using instead the temporal precedence implication of causality. Temporal precedence of entity x relative to the effect and temporal precedence of the effect relative to time t together add up to an evidential pattern that is noncommonly deducible from the problem at issue and could be used to resolve it in favor of an entity attribution in the same way as covariation.

The difference between the notions of noncommon deducibility and of covariation stands out particularly in those cases in which covariation is *commonly* rather than *noncommonly deducible* from the alternative propositions considered by the knower. Consider the case in which the knower's problem is to determine the direction of causality, as in choosing among the alternative propositions whether "A caused B" or "B caused A." Even though we are dealing here with a causal problem and covariation is deducible from the idea of causality, in the case at hand, covariation is commonly rather than noncommonly deducible from the alternative propositions considered by the knower: The proposition "A caused B" implies that A and B would covary across times, but the alternative "B caused A" implies the very same covariation.

Thus, because it lacks noncommon deducibility in this case, covariation evidence would not be useful to the knower in attempting to decide between the alternative propositions concerning the direction of causality.

It is also reiterated that whereas covariation is deducible from the notion of causality, it is not so deducible from numerous other notions that the knower's epistemic problems could sometimes address. In the latter cases noncommonly deducible evidence would be quite dissimilar from covariation evidence. Suppose that at a professional meeting conducted many years ago a young psychologist p was greatly impressed by professor P with a distinct German accent and the young psychologist wondered whether the professor might be Kurt Lewin or Wolfgang Kohler. Suppose further that the curious youth eavesdropped on P and overheard him say that he was born in Prussia in the year 1890. Being acquainted with biographies of the personalities involved, our knower might quickly realize that the evidence was consistent with the Lewin hypothesis and inconsistent with the Kohler hypothesis. In present terms the evidence would be noncommonly deducible from the alternative propositions of interest, although it hardly qualified as covariation; it would seem somewhat incorrect to say that Lewin "covaried" with the specific date and place of birth so that whenever he was present or absent so were they.

In short, covariation evidence could sometimes be noncommonly deducible from the alternative propositions making up a knower's epistemic problem. But in other cases covariation evidence would be *commonly* deducible or completely *nondeducible* from such propositions. According to the present analysis, only in the first case and not in the latter ones would covariation evidence be of interest to the knower or affect the knower's confidence in a proposition or an inference.

*Discounting.* According to the discounting rule (Kelley, 1971, p. 8), "the role of a given cause in producing a given effect is discounted if other plausible causes are also present." In other words, the knower's confidence regarding the causal role of a given factor would be greater if it alone appeared as a plausible

cause. Note that the discounting rule may be interpreted to refer to the impact on a knower's confidence of noncommonly deducible information *inconsistent* with a causal hypothesis: A plausible competing cause is (trivially) consistent with itself, and at the same time is inconsistent with the alternative cause. According to the present theory, this should reduce confidence in the latter cause as implied by the discounting rule (Kelley, 1971).

The present concept of noncommon deducibility has implications that have not been obvious from the discounting notion. In particular, if discounting is a special case of noncommon deducibility, it should occur only when the alternative hypotheses considered by the knower appears truly inconsistent or mutually exclusive. This has not been as clear in extant discussions of the discounting rule that stressed the *number* of causal hypotheses rather than their contradictory nature. Yet intuitively it seems that the discounting phenomenon would not occur if the alternative hypotheses entertained by the knower overlapped. For instance, imagine a patient told by one physician that his/her particular symptoms were the result of influenza, and told by another physician that the symptoms were the result of a virus. It seems that the second suggestion would not cause any appreciable discounting of the first because the "virus" hypothesis does not exclude that of "influenza," so no inconsistency is involved. Although intuitively appealing, the present interpretation cannot, so far, claim systematic data in its support, and further research is needed to conclusively establish its validity.

Furthermore, in its extant formulation (Kelley, 1971), the discounting rule refers to the content of *causal* hypotheses; its present portrayal as a special case of noncommon deducibility suggests that the discounting effect should also occur with competing hypotheses whose content is not causal. For example, a person considering the possibility that the road to Jerusalem lay directly ahead might lose some confidence in this proposition if a sign indicated instead that the road lay to the right. Similarly, someone considering the possibility of the time being five o'clock might

lose some faith in this hypothesis if a glance at a friend's watch indicated five-thirty instead. In both cases the introduction of an incompatible alternative may reduce the knower's confidence in a given inference even though the hypotheses involved are not causal in nature.

*Jones and Davis's (1965) criteria of correspondent inference.* Jones and Davis (1965) articulated two major criteria whose fulfillment was assumed to lead to correspondent inferences. First, the number of noncommon effects separating the action from the unchosen alternative and second, the assumed social desirability of those effects. On close examination, both criteria turn out to reflect the noncommon deducibility logic as applied to the specific problem content addressed by the correspondent-inference model.

According to the noncommon-effects criterion, "the probability [of any effect of being the perceived goal of the action] should vary inversely as a function of the number of other effects competing for the perceiver's attention" (Jones & Davis, 1965, p. 228). Assuming that "probability of effect being the goal" means roughly the same as confidence in its being the goal, and the "effects competing for the perceiver's attention" are plausible alternative hypotheses about the action's underlying goal, the similarity of the effects principle to the discounting rule becomes apparent (as observed by Kelley, 1971, p. 8). Thus, the earlier interpretation of discounting as an instance of noncommon deducibility extends to the number of effects criterion as well. For a given perceiver the proposition that effect x was the likely goal of some action is (trivially) *consistent* with itself and *inconsistent* with the hypothesis that effect y was the exclusive goal; because of the inconsistency, the perceiver's confidence should be lowered as compared to the case where only x or only y appeared as a likely goal.

In addition to their number of effects principle, Jones and Davis (1965) viewed as a major condition for a correspondent inference a low assumed social desirability of the act's (noncommon) effects. Recall (a) that a correspondent inference was defined in terms of

the degree to which "the judged value of the attribute departs from the judge's conception of the average person's standing on that attribute" (Jones & Davis, 1965, p. 224), and (b) that the epistemic problem featured in the Jones and Davis (1965) analysis was to decide whether an act was caused by a correspondent attribute. It should be clear that low (assumed) social desirability is consistent with the correspondent-attribute hypothesis and inconsistent with the noncorrespondent-attribute hypothesis: If the actor's reason for a behavior is rare within a culture (i.e., low in assumed social desirability), so must be the underlying attribute. This would render correspondent the inference in question. In the foregoing sense then, assumed social desirability constitutes a noncommonly deducible implication of the propositions that a correspondent versus a noncorrespondent attribute prompted a given act.

For example, in the classical experiment by Jones, Davis, and Gergen (1961), subjects inferred with greater confidence that an actor had a particular personality characteristic when he/she behaved consistently with the characteristic and contrary to role requirements (or, out of role) that presumably would have elicited the opposite behavior from most people. The low assumed social desirability of the particular behavior in this case is *consistent* with the proposition that the actor had an unusual degree of the particular characteristic or inconsistent with the proposition that he/she was about average on that particular characteristic: Simply, the knower (the perceiver) may reason that an unusual degree of the characteristic implies that it may manifest itself despite inhibitive situational constraints, whereas a merely average degree of the characteristic implies that it would not be manifest under such constraints. Thus, the actor's out-of-role behavior in the Jones et al. (1961) experiment is noncommonly deducible from the propositions that the actor deviates versus does not deviate from the average person on some trait, or in Jones and Davis's (1965) terms that the inference is correspondent or not. Note that although the noncommon deducibility principle can be used to generate the assumed social

desirability rule, it can also be used to generate alternative criteria for validating the correspondence of an inference. For instance, insofar as a correspondent attribute is above all an attribute, that is, a trait steadily owned by a person, it affords the deduction of *stability*, or recurrence of the same act on numerous similar occasions. Such stability would differentiate the correspondent attribute hypothesis from the one alternative that the act was caused by a momentary whim. Furthermore, from the specific content of any correspondent attribute, one could deduce a variety of different acts whose collective appearance in the appropriate circumstances would convergently validate the attribute in question (Ajzen & Fishbein, 1975).

*Augmentation.* A major attributional principle featured in Kelley's (1971) analysis is the augmentation rule whereby

if for a given effect both a plausible inhibitory cause and a plausible facilitative cause are present, the role of the facilitative cause in producing the effect will be judged greater than if it alone were present as a plausible cause for the effect. (p. 12)

In different terms (Kruglanski, Schwartz, Maides, & Hamel, 1978), if an effect occurred despite a potent counterforce (inhibitory cause), the prompting force (facilitative cause) would be believed of considerable magnitude. Note that occurrence of an effect despite a hindrance is noncommonly deducible from the epistemic problem of whether the cause was of a considerable versus a slight magnitude: Occurrence in the face of a hindrance is *consistent* with the "considerable magnitude" hypothesis and *inconsistent* with the "slight magnitude" hypothesis. Direct experimental evidence for the augmentation effect has been furnished by Kruglanski, Schwartz, Maides, and Hamel (1978).

Note again that the noncommon deducibility idea suggests that it is possible to derive criteria other than the augmentation principle from the "considerable causal magnitude" hypothesis. For example, all else being equal, the hypothesis that the cause was of considerable magnitude implies a large magnitude of the effect. Thus high magnitude of effect would be evidence noncommonly deducible

from the propositions that the cause was of a considerable versus a slight magnitude.

Weiner et al.'s (1971) conditions for achievement-related attributions. In their attributional analysis of behaviors in achievement contexts, Weiner et al. (1971) identified some stimulus conditions assumed to result in attributions to ability, luck, effort, and task difficulty. For instance, attribution of success to task ease is assumed likely if most persons, in addition to the actor, also succeeded at the task. Attribution of success to effort is assumed likely given evidence regarding "(1) covariation of performance with incentive value or . . . (2) with cues as perceived muscular tension, or task performance" (Weiner et al., 1971, p. 5). The epistemic problem addressed by Weiner et al. was to decide among the propositions that a performance outcome (a success or failure) was caused exclusively by outstanding ability, effort, luck, or task ease (difficulty). The kinds of evidence just listed are *noncommonly deducible* from these propositions: Success on task by most other persons is consistent with the hypothesis that task ease may constitute the explanation and is inconsistent with the hypothesis that ability, effort, or luck has to be the exclusive explanation. Similarly, "covariation of performance with incentive value" is consistent with the effort hypothesis and is inconsistent with the ability, luck, or ease hypotheses. Note that here, also, the noncommon deducibility principle could be used to generate other kinds of evidence than those listed by Weiner et al. Thus, in addition to the success of many persons, task ease may also imply a speedy performance or success without preparation; the effort hypothesis might sometimes imply long hours at the task, experienced weariness in the aftermath of task completion, and so on; in short, all possible implications of the effort, ease, ability, and luck hypotheses could occasionally constitute noncommonly deducible items of evidence and be used to validate the hypotheses in question.

## Discussion

In the preceding sections I attempted to demonstrate that various attributional criteria may represent the noncommon deducibility logic applied to specific epistemic problems. Thus, the notion of noncommon deducibility provides the general construct whereby separate attributional notions as apparently different as say, "discounting," "assumed social desirability," or "covariation" are integrated.

But the generality of the noncommon deducibility concept extends beyond the attributional criteria articulated so far: (a) Given the same epistemic problem that the original criterion was meant to resolve, the noncommon deducibility notion may be used to generate alternative, functionally equivalent criteria. As has been shown, such criteria may refer to implications of the knower's hypotheses that the original criteria did not address. (b) The notion of noncommon deducibility extends beyond the epistemic problems covered by extant attributional formulations. Those formulations addressed specific epistemic problems, whereas the logic of noncommon deducibility is assumed applicable to all epistemic problems regardless of content.

Finally, the notion of noncommon deducibility renders explicit the idea that an item of information (e.g., an attributional criterion) may validate a hypothesis (e.g., proposition, or attribution) only when it differentiates it from the competing propositions that the knower may consider plausible. In other words, criteria for the same attribution would vary as a function of the total epistemic problem confronted by the knower. To reiterate an earlier example, the knower with a problem of deciding whether A caused X or B caused X might well use as a criterion for the A-caused-X attribution evidence of covariation between A and X and an absence of covariation between B and X. But a knower confronted with a problem of deciding whether A caused X or X caused A would not likely use as a criterion (for the *same* A caused X attribution) evidence regarding A's covariation with X, as it would not differentiate that attribution from the competing X caused A

attribution of concern to the knower at the moment.

The present theory addressed the process of naive inference. It was suggested that this process begins with a purpose that an individual may have for acquiring a given item of knowledge, and that it consists of the stages of problem formulation and resolution, in the latter of which a major role is played by the logical principle of consistency. In accordance with this outline, it was proposed that requirements of functionality may constrain the epistemic problems formulated and the evidence types employed to resolve them: (a) The epistemic problem formulated by the knower must be teleologically relevant to this individual's purpose such that the resolution must be believed to advance the purpose in some way, and (b) the evidence employed by the knower must be validationally functional to the knower's problem. The evidence must be noncommonly deducible from the problem's constitutive propositions so as to facilitate a choice among them. Beyond considerations of functionality, the epistemic contents dealt with by the layman (the problems and evidence types attended to) would depend on their momentary availability, that is, on the ease with which they may come to a person's mind in the situation.

Extant attribution-theoretic formulations were reviewed from the present epistemic perspective and the following major generalizations were arrived at. First, the various attributional models differ in the particular epistemic problems and the particular attributional criteria with which they deal. In this sense, the attributional models concern particular instances of inference rather than the underlying inferential process. Second, the necessary applicability conditions of the attributional models are teleological and validational functionalities of the particular epistemic problems and informational criteria featured in the models: To adequately depict the knower's epistemic activities in some situation, the epistemic problem featured in a given model must be functional to the person's situational objective, and the attributional criteria specified in the model must be noncommonly deducible from the problem in

question. Thus, the present paradigm provides an integrative framework that enables consideration of diverse attributional models in common theoretical terms and that delineates the applicability conditions of various such models.

The empirical support for the present theory may be classed into two categories: (a) Much of the evidence directly supportive of "veteran" attributional formulations supports the epistemic framework to the extent that it indeed subsumes them as special cases, and (b) evidence for unique implication of the novel framework not readily derivable from previous analyses. Support in the first category is represented, for example, by McArthur's (1972) results regarding the effects of consensus, distinctiveness, and consistency criteria introduced by Kelley (1967). In the same category also falls evidence for the discounting and the covariation principles (summarized by Kelley, 1971) and for the correspondent-inferences theory (summarized by Jones & McGillis, 1976).

Support in the second category has included the previously described findings regarding teleological and validational functionality as they may affect the knower's interest, in particular, epistemic problems and/or evidential patterns. Admittedly, further research on the unique implications of the present theory is well indicated. Some such research might further test the present implications regarding conditions under which a given attributional principle (e.g., discounting or covariation) would or would not affect the knower's inferences. Alternatively, one might apply the epistemic model to contents not previously addressed by attributional formulations. For example, the discounting rule (Kelley, 1971) has been enunciated in reference to causal hypotheses, but the present analysis suggests it to be applicable to hypotheses of whatever type, including non-causal ones as well.

The present article necessarily addressed only a portion of issues relevant to human epistemic behavior. Some major remaining ones are now indicated in passing.

1. *Inferential biases and errors.* These have been typically viewed as deviations from epi-



stemic rationality, possibly deriving from reliance on various suboptimal schemata (Kelley, 1972), strategies, or heuristics (Tversky & Kahneman, 1974). By contrast, the epistemic process outlined herein, although conceived of as rational, allows at the same time for the possibility of biases and errors stemming, for example, from the momentary unavailability of hypotheses or information to the knower.

2. *Motivational influences on the epistemic process.* A special category of inferential biases may stem from the influence of needs and desires on a person's confidence in various propositions. Writers on attribution have listed various such influences (e.g., Jones & Davis, 1965; see Kelley, 1967, 1971; Miller & Ross, 1975), but their place in the lay epistemic framework remains to be explicated.

3. *Relation of the lay epistemic theory to other conceptualizations in cognitive social psychology.* Contemporary social psychology has laid considerable stress on the role in human affairs of the acquisition and utilization of lay knowledge. Theories of cognitive consistency (see Abelson et al., 1968), of social comparison processes (Festinger, 1954), and of attitude formation and change (Fishbein & Ajzen, 1975; Himmelfarb & Eagly, 1974; Insko, 1967) all contain a distinct aspect of knowledge acquisition. Insofar as the present epistemic framework is assumed to address the process whereby all knowledge is gained, it could provide the basis for linking together the epistemic aspects of several disparate formulations in cognitive social psychology.

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