COMPARING THREE MODELS IN CAUSAL INFERENCE: HOW ARE CONSENSUS, DISTINCTIVENESS, AND CONSISTENCY INFORMATION PROCESSED?

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摘　　要

　　一般人如何使用一致（ consensus ）、獨特（ distinctiveness ）、及持久（ consistency ）訊息來做歸因？本文比較分析了三個模式的看法，它們都脫胎於凱利（ H. Kelley ）的共變模式。第一個模式稱爲模板模式（ templates　model ），認爲在一致訊息、獨特訊息及持久訊息的各種可能組合中，有三個組型是基本的，人們即利用此三個組型做爲認知基模（ schemata ）來解釋他人及自我的行爲；第二個模式稱爲邏輯模式（ logical　model ），認爲一般人在歸因時，是從行爲者、刺激物、及情境三者之中選出必要條件做爲行爲的起因；第三個模式稱爲反常條件焦點模式（ abnormal　conditions　focus　model ），認爲行爲者、刺激物、及情境三者都是必要條件，訊息的功能在於指出當中何者是反常的，人們即將行爲歸因於此一反常條件。本文也分析了三個模式的一些問題及突破的方向。

Abstract

　　The present article is concerned with ‘ how laymen use consensus, distinctiveness, and consistency information to make attributions in terms of the person, the stimulus, and/or the circumstances. To attack this problem, three models in the literature emphasized causal schemata, necessary conditions and focused abnormal conditions, respectively. The template model argued that three typical information patterns which were found in the earlier literature to lead to person, stimulus, and circumstnce attribution respectively serve as causal schemata or templates. Other patterns with complete or incomplete information will be compared with or related to the three templates. Then the individual interprets the behavior in terms of the attributions implied by the matched templates. The logical model suggested that laymen use the principle of covariation to figure out which of the person, the stimulus, and/or the circumstance is the necessary (and sufficient in the complete information patterns) condition for the behavior to occur, then assign it as the cause of the behavior. The abnormal conditions focus model claimed that persons, stimuli, and circumstances are all necessary conditions for a behavior to occur. Information has the function to indicate whether the particular person, the particular stimulus, and/or the particular circumstance is abnormal or unusual. In

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addition, world knowledge interacts with the contrast criterion to define the abnormal conditions.

Attribution theory

Attribution theory is concerned with how ordinary people explain behavioral events. Heider's (1958) book, The Psychology of Interpersonal Relations, has generally been recognized as establishing the area of attribution theory. Kelley's (1967) covariation model, derived from Heider's work, assumed that common people's understanding of the distal environment is gained in a way similar to the experimental method. "The effect is attributed to that condition which is present when the effect is present and which is absent when the effect is absent," stated Kelley (p. 194). In addition, it was assumed that people are concerned with the dispositional properties of persons and entities. The choice is between internal and external attribution. How do people make this choice when a particular behavior occurs? Given the information that (a) the same behavior is produced by other people in the presence of the entity (high consensus); (b) the behavior occurs when other entities are present (high distinctiveness); and (c) the behavior occurs whenever and in whatever way the entity is presented (high consistency), the behavior will be attributed to the entity — the stimulus toward which the behavior is directed. Similarly, given the information of low consensus, low distinctiveness, and high consistency (LLH), the behavior will be attributed to the person who produces the behavior.

Kelley's model first got support from McArthur's (1972) study. In addition to the two typical information patterns (HHH & LLH) described above, McArthur found that a pattern of low consensus, high distinctiveness, and low consistency information (LHL) was typically interpreted by subjects in terms of circumstance. Orvis, Cunningham, and Kelley (1975) consequently argued that these three typical patterns serve as templates with which other information patterns are compared in order to be interpreted. Namely, the other patterns are interpreted in terms of the templates with which they are consistent.

In opposition to the template model, Jaspars (1983) proposed a logical model, claiming that perceivers consider different causal loci as necessary or sufficient conditions for the occurrence of a behavior. The effect will be attributed to the condition which is both necessary and sufficient. In other words, the behavior occurs if and only if the condition is present (Hewstone & Jaspars, 1987).

A third model, the abnormal conditions focus model, was proposed by Hilton

& Slugoski (1986). This model, based upon ordinary language philosophy, postulated that persons, stimuli, circumstances, and their possible combinations serve as multiple necessary conditions. Given the consensus, distinctiveness, and consistency information, people use contrastive criteria, which render some of the conditions abnormal. to select the cause from the necessary conditions. In addition, this model emphasized the interactions between formal logical thinking and world knowledge.

All three models dealt with the problem, i.e., how people use the consensus, distinctiveness, and consistency information to asign the person, the stimulus, and/or the circustance as cause of a behavior. All three models were supported by their own data. The goal of the present article is to compare in one framework the different predictions of the three models.

Kelley's Cube

Dealing with the case that the attributor has information from repeated/multiple observations, Kelley (1967) suggested that people infer the cause of a behavior from the observation of covariance. The principle is: "An effect is attributed to the one of its possible causes with which, over time, it covaries" (Kelley, 1973, p. 108). In other words, an effect is attributed to the cause with which it is uniquely associated or correlated. In terms of the analysis of variance (ANOVA), Kelley regarded persons, entities, and time as three salient independent variables and effect (behavior) as the dependent variable. If a person behaves in agreement with consensus of other persons' behaviors toward the entity, behaves distinctively toward the entity, and behaves in this way consistently over time/modality, the effect (behavior) will be attributed to the entity because it covariates only with the entity. Consider the following example adapted from McArthur's (1972) study:

> Ralph trips over Joan's feet while dancing.
> Almost every other boy trips over Joan's feet while dancing (high consensus).
> Ralph does not trip almost any other girl's feet while dancing (high distinctiveness).
> In the past, Ralph has almost always tripped over Joan's feet while dancing (high consistency).

The effect will be attributed to something about the stimulus, Joan. If the following information pattern (LLH) was given for the same event:

> Hardly any other boy trips over Joan's feet while dancing (low consensus).
> Ralph trips over almost every other girl's feet while dancing (low distinc-

tiveness).

In the past, Ralph has always tripped over Joan's feet while dancing (high consistency).

The effect will be attributed to something about the person Ralph because it is uniquely associated with Ralph.

Only the above two predictions can be explicitly derived from the ANOVA model because Kelley (1967) was concerned about choice between external and internal attribution. However, these two predictions were supported well by McArthur's (1972) study. In addition, McArthur found that the frequency of circumstance attribution was greatest with the information pattern of low consensus, high distinctiveness, and low consistency (LHL). Because McArthur focused on the main effects of consensus, distinctiveness, and consistency information, she did not make specific predictions for many of the eight (2^3) possible information patterns. How do people make attributions, given another atypical information pattern? In addition, one important limitation of Kelley's model is that perceivers commonly observe an actor in only one situation and may not have complete information on a variety of possible causes. How do people make attributions when they have incomplete information? These problems were first tried to be answered by the template model.

Template Model

Recall that, for HHH, LLH, and LHL information patterns, stimulus (S), person (P), and circumstance (C) attributions will be predicted respectively (see Table 1).

Table 1: Information Templates for the Three Attributions

Information templates			Attributions
Consensus	Distinctiveness	Conssistency	
H	H	H	S (Stimulus)
L	L	H	P (Person)
L	H	L	C (Circumstance)

Note: H=high; L=low.

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The template model (Orvis, Cunningham, & Kelley, 1975) suggested that both complete and incomplete information patterns will generate the attributions implied by the three templates with which it is consistent. Three principles were used in these procedures. First, if a new information pattern is consistent with only one of the three templates, the attribution implied by the particular template will be predicted for the new information pattern. For example, H— — pattern (distinctiveness & consistency information are missing) is consistent with only the HHH template, so the stimulus (S) attribution is predicted. Second, if a new information pattern is consistent with more than one of the three templates, the attribution listed most frequently will be predicted for the new information pattern. For example, in the H-H pattern (distinctiveness information is missing) high consensus information is consistent with HHH template (S attribution) and high consistency informatin is consistent with both HHH template (S attribution) and with LLH template (P attribution). Here, the stimulus attribution will be predicted because it was listed more frequently than person attribution. Third, if a new information patttern is consistent with more than one of the three templates, and if the attributions are listed equally frequently, the combination of those listed attributions will be predicted for the new information pattern. For example, in the HLH pattern, high consensus is consistent with HHH template (S attribution), low distinctiveness is consistent with LLH template (P attribution), and high consistency is consistent with both HHH and LLH. The PS (person and/or stimulus) attribution will be predicted here because both P and S are listed twice. All predictions made by this model for various types of information patterns are listed in Table 2.

Note that the template model is not completely in agreement with Kelley's original ideas in covariation model, though Kelley seemed to adopt the template model, also. If an effect is attributed to that condition with which it covariates, then the PSC, not the C, attribution should be predicted for the LHL template because the effect covariates with person, stimulus, and circumstance simultaneously. Thus, the template model is partly a "data-driven," and partly a "theory-driven," model.

How about the predictive efficacy of this model? For each information condition listed in Table 2, the largest frequency was compared with the average frequency of the six remaining attributions (seven possible attributions including: P, S, C, PS, PC, SC & PSC) in Orvis, et al's (1975) studies. It was found that, of the 26 predictions, 20 yielded significant results in their study 1, and 19 in their study 2.

Logical Model

The logical model, developed by Jaspars (Hewstone & Jaspars, 1987; Jaspars, 1983; Jaspars, Hewstone, & Fincham, 1983), is directly derived from Kelley's covariation model. This model suggested that, for vignettes of the McArthur type, the information might be coded for presence or absence of the behavior, the person, the stimulus, and the circumstance. Consequently, one can establish whether the presence of any combination of the latter three determinants (P, S, C) is a necessary and/or sufficient condition for the behavior to occur.

If the behavior is present when the condition is present, the condition is a sufficient condition. If the behavior is absent when the condition is absent, the condition is a necessary condition. "If the behavior occurs if and only if the condition is present, then the condition is both a necessary and sufficient condition for the behavior to occur" (Hewstone & Jaspars, 1987, P. 665). If a behavior is attributed to the condition that is present when the behavior is present and absent when the behavior is absent (Kelley, 1967), the behavior is attributed to a both sufficient and necessary condition.

Jaspars was interested in the predictions of the eight complete information patterns. For describing how common people process consensus, distinctiveness and consistency information to make attributions, consider again the example, "Ralph trips over Joan's feet wile dancing". Given the HHH information pattern, the stimulus (Joan) is a sufficient condition for the behavior to occur because the behavior is present when the stimulus is present — the behavior can generalize over other persons (high consensus) and over other circumstances (high consistency). In addition, the stimulus is also a necessary condition for the behavior to occur because when the stimulus was absent, the behavior did not occur (high distinctiveness). So, the stimulus is both sufficient and a necessary condition and will be selected as the cause of the behavior. As to other causal loci, the person (Ralph) and the cirucmstance (the particular occasion) are neither sufficient conditions (because the behavior cannot generalize over other stimuli — high distinctiveness), nor necessary conditions (because the behavior can occur without them — high consensus and high consistency). Likewise, the combination of person and circumstance (PC) is neither a sufficient nor a necessary condition. However, any combination involving stimulus (SP, SC, SPC) is a sufficient but not necessary condition (e.g. the combination of Ralph and Joan will let the behavior occur, but the combination of other boys and Joan will also let the behavior occur, according to the high consensus information). The same rule can be applied to all eight complete information patterns, as explicitly

carried out by Jaspars and his colleagues. At the same time, it was found that this model is superior to the template model in the predictions of the eight complete information patterns (Hewstone & Jaspars, 1987; Jaspars, 1983). It is still unknown, however, whether or not this model is superior to the template model in the predictions of the incomplete information patterns.

It seems implausible to assume that subjects will go through such a complex process to figure out the sufficient and necessary condition(s). Jaspars (1983) noted this, and suggested that the subject "only has to verify which determinants are absent when the behavior is absent in order to determine the cause of the behavior" (p. 30). Therefore, the lay person's attributional process is simplified as to finding out the necessary condition(s) (also see Hewstone & Jaspars, 1987). This simplified principle can be easily applied to the eight complete information patterns and predict all the same attributions as the original principle. In addition, the simplified principle can be applied to incomplete information patterns readily. For example, given the L$--$ information pattern, low consensus information indicates that the person is absent when the behavior is absent, so the person will be selected as the cause of the behavior. Given the -LH infomation patterns, no condition is necessary, so the predicted attribution is zero. All predictions for the complete and incomplete information patterns are listed in Table 2.

However, it should be noted that, given the eight complete information patterns, the only necessary condition or the combination of the multiple necessary conditions will also be a sufficient or jointly sufficient condition for the behavior to occur. For example, given the LHH pattern, low consensus and high distinctiveness information indicate that both the person and the stimulus are necessary conditions. In addition, the behavior can generalize over circumstances (high consistency), so the combination of the person and the stimulus PS is also a jointly sufficient condition for the behavior to occur. But given incomplete information patterns, whether the necessary condition is also a sufficient condition is unknown. For example, given the low consensus information of only L$--$, the person is a necessary condition; but whether the behavior can generalize over stimuli and over circumstance is unknown, i.e., whether the person is also a sufficient condition is unknown. The similar uncertainty is held for all incomplete information patterns. Consequently, if Jaspar's original principle, that the behavior is attributed to the sufficient and necessary condition, were to be insisted, the logical model would not be able to handle all the incomplete information patterns. Jaspar's simplified principle is used by the present analysis because (1) it predicts the same attributions as the original principle does, given the complete information patterns; (2) it can handle the

incomplete information patterns; (3) it does not complicate people's attributional processes; and (4) the necessary condition in the incomplete information patterns is still a possible sufficient and necessary condition for the behavior to occur.

Abnormal Conditions Focus Model

A sufficient and necessary condition is not necessarily considered as a cause of an effect. For example, few people consider birth as a cuase of death although birth is both sufficient and necessary for death. But car accident could be the cause of death because it is a "difference in the background" (Einhorn & Hogarth, 1986). In other words, it is an unusual, abnormal condition in the "causal field" (Mackie, 1974).

The default abnormal conditions focus model, a content-free model, includes four rules (Hilton & Slugoski, 1986, pp. 78-79):

1. Assume that features of the person, the stimulus, and the circumstances are each necessary conditions, and hence, possible causes, for the occurrence of the target event.

2. If low consensus information indicates that the target person is unusual, dignify the person as the abnormal condition causing the event.

3. If high distinctiveness information indicates that the stimulus is unusual, dignify the stimulus as the abnormal condition causing the event.

4. If low consistency information indicates that the present occasion (circumstances) is unusual, dignify the present occasion as the abnormal condition causing the event.

These four rules can be understood as the contrastive principle (Hart and Honore, 1959), or using a different term, as the difference-in-a-background (Einhorn & Hogarth, 1986; Mackie, 1974). For example, given HHH information pattern, high consensus indicates that the person is mere condition, high distinctiveness indicates that the stimulus is abnormal, and high consistency indicates that the circumstances are mere conditions. Consequently, the stimulus is dignified as the cause of the behavior (event). Similarly, given an HLH information pattern, every condition is mere condition, so nothing will be dignified as cause; give an LHL information pattern, every condition is abnormal, so their combination PSC will be dignified as the cause. The predicted attributions for the eight complete information patterns will be all the same as those predicted from the logical model.

However, the main contribution of the abnormal conditions focus model is that

the interactions between world knowledge and the contrastive principle are considered. Given a scripted event, the information of high consensus, low distinctiveness and high consistency might not be informative. Given a non-scripted event, high consensus information might indicate that the stimulus is abnormal, low distinctiveness might indicate that the person is abnormal, and high consistency information might reinforce the person and/or the stimulus attribution. Consider the following example used by Hilton and Slugoski (1986):

Sally buys something on her visit to the supermarket.

Almost everyone else buys something on their visits to this supermarket (high consensus).

Sally buys something on her visit to almost every other supermarket (low distinctiveness).

In the past, Sally has almost bought something on her visit to this supermarket (high consistency).

Because the vignette supplies a scripted event, high consenseus, low distinctiveness, and high consistency information are not informative and no condition is abnormal. Consider another example as follows:

Ralph trips over Joan's feet while dancing.

Almost every other boy trips over Joan's feet while dancing (high consensus).

Ralph trips over almost every other girl's feet while dancing (low distinctiveness).

In the past, Ralph has almost always tripped over Joan's feet while dancing (high consistency).

Because the vignette supplies a non-scripted event, the same information pattern (HLH) is now informative. It seems that both Ralph and Joan are abnormal (e.g. both are clods). This prediction is supported by Hilton and Slugoski's (1986) own study. Consequently, subjects' real-world knowledge about presupposed norms can interact with the given information to define abnormal conditions. The following rules can be derived from the full version of abnormal conditions focus model for the non-scripted events:

1. High consensus information indicates that the stimulus (S) is abnormal.

2. Low consensus information indicates that the person (P) is abnormal.

3. High distinctiveness information indicates that the stimulus (S) is abnormal.

4. Low distinctiveness information indicates that the person (P) is abnormal.

5. High consistency information only strengthen the person and/or the stimulus attribution, depending on the consensus and distinctiveness information.

6. Low consistency information indicates that the particular occasion (C) is

abnormal.

It is implied by the six rules that consensus and distinctiveness information control the person and the stimulus attributions, while consistency information control the cirucmstance attribution (cf. Schneider, Hastore, and Ellsworth, 1979, p.55). In addition, the abnormal condition or combined conditions will be focused and selected as the cause of the behavior. All the predicted attributions for the 26 information patterns are listed in Table 2 in which the four attributions predicted for the complete information with high consistency information have been explicitly carried out by Hiltion and Slugoski. However, the differences between multiple necessary conditions (P × S) and multiple sufficient condition (P + S), noted by Hilton and Slugoski, are ignored in the present comparison because these differences can not be derived from the template model, in which PS only implies the person *and/or* the stimulus.

Summary of the Three Models and General Discussion

How do laymen process the consensus, distinctiveness, and consistency information in order to make an attribution about a behavior? The template model suggested that the three information patterns which predict the person, the stimulus, and the circumstance respectively are used as prototypes or causal schemata. All other information patterns are compared with these three templates and are interpreted in terms of the attributions implied by the three typical attributions implied by the three typical patterns. The logical model suggested that subjects are trying to find out the necessary conditions implied by the information, or in a stronger form, to find out the conditions which are both sufficient and necessary. The abnormal condtions focus model suggested that, from multiple necessary conditions, subjects select the abnormal one(s) as the cause of the behavior. In addition, the abnormal conditions are defined by the interactions between subjects' world knowledge and contrastive principle. The predictions of the three models for the 26 information patterns are summarized in Table 2.

Combination of Causal Loci

Regarding the response language, some "combination" of causal loci has been used by many attributional researchers who were interested in Kelley's cube (e.g. Hewstone & Jaspars, 1983; Major, 1980; McArthur, 1972; Smith & Miller, 1979 Zuckerman, 1978). However, how these causal loci (P, S, C) are combined is

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Table 2: Summary of Attributions Predicted from Three Models

Information patterns:			Predicted attributions of three models:			different predictions
Cs	D	Cy	Template model	Logical model	Abnormal conditions	
H	—	—	S	O	S	*
L	—	—	PC	P	P	*
—	H	—	SC	S	S	*
—	L	—	P	O	P	*
—	—	H	PS	O	O	*
—	—	L	C	C	C	
H	H	—	S	S	S	
H	L	—	PS	O	PS	*
L	H	—	C	PS	PS	*
L	L	—	P	P	P	
H	—	H	S	O	S	*
H	—	L	SC	C	SC	*
L	—	H	P	P	P	
L	—	L	C	PC	PC	*
—	H	H	S	S	S	
—	H	L	C	SC	SC	*
—	L	H	P	O	P	*
—	L	L	PC	C	PC	*
H	H	H	S	S	S	
H	H	L	SC	SC	SC	
H	L	H	PS	O	O	*
H	L	L	PSC	C	PSC	*
L	H	H	PSC	PS	PS	*
L	H	L	C	PSC	PSC	*
L	L	H	P	P	P	
L	L	L	PC	PC	PC	

Note: Cs=Consensus; D=Distinctiveness; Cy=Consistency; S=Stimulus; P=Person; C=Circumstance; O=no attribution can be determined from the information given; H=High; L=Low; *=different attributions were predicted.

not clear. McArthur was aware that two different kinds of combination, namely, multiple sufficient conditions and multiple necessary conditions, could be detected. For example, given the following event and information:

Ralph trips over Joan's feet while dancing.

Hardly any other boy trips over Joan's feet while dancing.

Ralph trips over hardly any other girl's feet while dancing.

In the past, Ralp has almost always tripped over Joan's feet while dancing. it seems that Ralph and Joan cannot groove together very well (multiple necessary condition). If the following information are given for the same event:

Almost every other boy trips over Joan's feet while dancing.

Ralph also trips over almost every other girl's feet while dancing.

In the past, Ralph has almost always tripped over Joan's feet while dancing. it seems that Ralph is a clod and Joan is also a clod (multiple sufficient conditions).

The way in which the causal loci are combined is clearest in the logical model among the three models explored in the present study. All the combinations of causal loci predicted by the logical model are multiple necessary conditions because sufficient (but not necessary) conditions will not be assigned as causes by the model, it is less clear in the abnormal conditions focus model how causal loci are combined, though Hilton and Slugoski (1986) have paid attention to the difference between multiple sufficient and multiple necessary conditions. For some information patterns, the attributions predicted by this model are combinations of sufficient conditions and necessary conditions. For example, given the HLL information pattern, the model predicts that the person, the stimulus, and the circumstance are abnormal, and the combination of them (PSC) is the cause. However, in this combination, the person and the stimulus are sufficient conditions; but the circumstance is a necessary condition. For another information pattern such as H-L, the SC attribution is predicted by the model. However, the stimulus is a sufficient condition, and the circumstance is a necessary condition. Considering all 26 information patterns, at least 3 kinds of combinations can be differentiated: (a) multiple sufficient conditions; (b) multiple necessary conditions; (c) mixed sufficient and necessary conditions. How to measure these different kinds of combinations (especially the mixed ones) is a problem waiting for being considered by the abnormal conditions focus model.

It is least clear in the template model how causal loci are combined. In Orvis et al's (1975) language, PS implied "the person and/or the stimulus". There is no way to infer different kinds of combinations in terms of this model.

Particular circumstance/occasion

Even though "something about the particular occasion" is used instead of "something about particular circumstance", the improvement might be doubtful. The overinclusion of the word, *circumstance,* cannot account for all the reasons why, in Orvis, et al's (1975) study, the C attribution always got highest frequency when the SC, PC, or PSC was predicted. In Hilton & Slugoski's (1986) study, "occasion" was used instead of "circumstance", but PC, SC, and PSC attributions still got high means when C attribution was predicted by the study.

The basic problem might be that "smething about the particular occasion/circumstance" implies three possible kinds of factors: (a) unstable factors within the person (mood, intention, fatigue, etc.); (b) unstable factors within the stimulus; (c) unstable factors outside the person and stimulus. Consider the example, Ralph trips Joan's feet while dancing, again. Given the information that in the past, Ralph has almost never tripped over Joan's feet while dancing, the circumstance attribution will be predicted by all three models. However, those time-specific cirucmstance factors could include: (a) Ralph is drunk while he is dancing with Joan (PC?); (b) Joan is distracted while she is dancing with Ralph (SC?); (c) Ralph and Joan can not groove together very well for that particular style of dancing (PSC?); (D) The party is too crowded (C?). Consequently, subjects might have difficulty selecting one from these four kinds of attributions involving particular occasion/circumstance, especially if subjects indeed use concrete knowledge to interpret an event rather than if they use abstract reasoning (Read, 1987). In the abstract language world, circumstance/occasion seems to be an independent causal locus of the person and the stimulus. In the real world, however, circumstance/occasion is usually defined in terms of the person and the stimulus. This problem will reduce the competing power of any study if the three models predict different attributions among C, PC, SC and PSC. It also points out the need to explore the relationships between the person, the stimulus, and the circumstance, and to consider the attributional processes with concrete knowledge in the future study.

Beyond the Three Models

For studying laymen's attributional processes, two directions are promising in future studies: (a) investigation attributional processes in terms of concrete knowledge, and (b) integrating different attribution theories.

The first direction implies analyzing attributors' real world knowledge (Hilton & Slugoski 1986) and knowledge structure (Read, 1987). The stimulus language and response language should be in terms of concrete knowledge. Derived from Schank and Abelson's (1977) analysis of knowledge structures, a knowledge structure approach to causal inference has been proposed by Read (1987). This model was interested in people's explanations about sequential behaviors in terms of goals, plans, and scripts etc. People's use of concrete knowledge was emphasized.

Buss (1978) argued that causes and reasons are logically different concepts. "Causes are that which brings about a change" and "reasons are that for which a change is brought about (e.g., goals, purposes, etc.)" (p. 1311). When perceivers answer the question why a particular behavior occurs, they can explain in terms of causes and/or reasons. However, this difference cannot be detected by any study which uses the traditional McArthur type of measurement. For example, "something about the person" could include intentions, purposes, traits, or emotions of the person. This confusion was common in many studies (e.g. Hiltion & Slugoski, 1986; Jaspars, 1983; McArthur, 1972; Orvis et al., 1975; Zuckerman, 1978). If the differentiation between causes and reasons is desired, concrete knowledge should be used in the response language.

The second direction implies that various theories of causality from different areas of psychology should be integrated, and that perception of physical causation and attribution of social events should be linked. Einhorn and Hogarth (1986) tried to propose such a general model of attribution. In their model, three variables were considered necessary to inferring that X causes Y: (a) the degree to which X is a difference-in-the-background, (b) the temporal order of X and Y, and (c) the causal chain or causal theory between X and Y. Other two variables were considered not necessary but compensatory to inferring that X causes Y: (a) the covariation of X with Y, and (b) similarity of X and Y. Put in this context, the abnormal conditions focus model seems to emphasize that the function of information is to indicate which condition is a difference-in-the-background, and the logical model seems to emphasize that the function of information is to indicate which condition covariates with the effect (behavior). However, the place of the template model is less clear. It should be helpful for understanding causal attribution if different theories can be related and integrated.

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