

When Ignorance Is Bliss

The Role of Motivation to Reduce Uncertainty in Uncertainty Reduction Theory

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Three studies were conducted with the goal to articulate and test models for integrating the concept of motivation to reduce uncertainty into the axiomatic structure of uncertainty reduction theory. Multiple models were considered, each model defining motivation to reduce uncertainty in a different way. Motivation to reduce uncertainty was defined as a scope condition (Model 2), as tolerance for uncertainty (Model 3), as a weighted function of uncertainty by its importance (Model 4), and as the difference between one's uncertainty level and one's tolerance for uncertainty (Models 5a and 5b). Each of these models was compared to the baseline model (Model 1) derived from the original presentation of the theory where level of uncertainty, by itself, serves as a determinant of various communication behaviors. Tests of these models in terms of their ability to predict information seeking and attraction reveal that none of the models provides a consistent integration of motivation to reduce uncertainty into uncertainty reduction theory. Rather, tolerance for uncertainty (Model 3) is one of three determinants of information seeking, while level of uncertainty (Model 1) is one of three determinants of attraction. This inability to integrate motivation to reduce uncertainty into uncertainty reduction theory can be attributed to the consistent failure to find support for deviance and incentive value as determinants of tolerance for uncertainty, the rejection of Axiom 3 in uncertainty reduction theory (which specifies a positive relationship between uncertainty and information seeking), and the rejection of Theorem 17 (which specifies a negative relationship between information seeking and liking).

Uncertainty reduction theory (Berger & Calabrese, 1975) was put forth over a decade ago as an explanation for certain interpersonal communication behaviors displayed during initial interactions. The inability to predict and explain others' actions was offered as the central motivating force guiding behavior in first

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encounters with others. Prominent among the behaviors explained by the theory are those concerned with finding out about others and those concerned with coming to like others. From the perspective of uncertainty reduction theory, high uncertainty is a stimulus for seeking information as well as an inhibitor of attraction. In other words, the theory predicts that lack of knowledge about others leads to attempts to reduce that uncertainty through the seeking of information; attraction for others is held in abeyance until such time as knowledge about the individuals is gained.

Perhaps the most widely believed principle in uncertainty reduction theory is Axiom 3 which specifies a positive relationship between level of uncertainty and information seeking. This axiom seems to make a great deal of intuitive sense: If one is uncertain (i.e., does not know), then seek information (i.e., ask); if one is certain (i.e., knows), then do not seek information (i.e., do not ask). Despite widespread belief in the validity of this axiom, tests of it are few in number and inconsistent in their findings. Douglas (1990b) noted that many "tests" of this axiom really do not directly assess the relationship between uncertainty and information seeking at all; rather, they tend to rely on the examination of question asking behaviors and then *infer* uncertainty must be decreasing along with the *observed* decrease in question asking. Douglas (1990b) provided a direct test that finds supports for this axiom in terms of question asking behaviors, and Kellermann (1984) provided evidence that both uncertainty and question asking jointly decrease over the course of conversations. However, in six separate tests of the axiom by Gudykunst (1985; Gudykunst & Nishida, 1984), one provided weak support for the predicted positive relationship, one resulted in a zero correlation, and the other four were in the exact opposite direction from that predicted by the theory. Gudykunst's results not only suggest that the reduction of uncertainty is accompanied by more rather than less information seeking, but they open the door to the possibility that information seeking reduces uncertainty rather than (or in addition to) uncertainty causing information seeking. However, many of Gudykunst's tests did not focus on initial interactions, and decisions about causal direction are not possible based on the nature of the research design and the correlational evidence offered.

While Axiom 3 relating uncertainty and information seeking is widely believed though not widely tested or corroborated, the nega-

tive relationship specified in Axiom 7 between uncertainty and liking is widely disbelieved despite frequent testing and support. Axiom 7 specifies that the more individuals can predict and explain others' behavior, the more they are attracted to those others. Many persons have registered some concern with this axiom. For example, it has been argued that persons can reduce their uncertainty about others such that they learn they dislike them (Scheidel, 1977), or, contrarily, that uncertainty (unpredictability) can be a source of attraction (Livingston, 1980). It is our contention that such arguments are maintained only by the selective use of past research results (Gudykunst & Nikida, 1984). Research done by Planalp and Honeycutt (1985) and Planalp, Rutherford, and Honeycutt (1988) suggested that uncertainty is typically *not* a source of attraction, and the set of tests of this axiom have revealed consistent support for the negative relationship posited (Douglas, 1990b). For example, Gudykunst, Yang, and Nishida (1985) found consistent support for this axiom in all nine tests conducted, Clatterbuck (1979) reported on 32 tests of the axiom of which 21 were significant and supportive with correlations ranging from $-.20$ to $-.35$, and Gudykunst (1985) found similar results across four tests of this axiom. The conclusion to be drawn is that the ability to predict and explain another's behavior is one determinant of attraction. Admittedly, the size of the correlations has consistently been in the $-.20$ to $-.35$ range and, perhaps, these relatively stable though low negative correlations provide the reason why this axiom continues to be questioned.

These two axioms permit the deduction of one theorem (Theorem 17) which specifies a negative association between information seeking and liking. Few tests of this theorem have been reported, although those available generally have reversed the uncertainty reduction prediction or rejected any relationship existing between the two variables (Gudykunst, 1985; Gudykunst & Nishida, 1984). Frankly, it is not clear why information seeking would decrease as liking increased other than being required by deductive inference from the axiomatic structure of uncertainty reduction theory. In fact, it seems more reasonable to suggest that persons will seek information about and from those they like rather than those they dislike.

The inconsistent results for the information seeking axiom and the information seeking/liking theorem coupled with the stable, though low, correlations found for the liking axiom can be accounted for in a

number of ways. Certainly, the axiomatic relationships could simply be incorrect. Rather than the direct, positive relationship between uncertainty and information seeking specified in Axiom 3, information seeking may be inversely related to uncertainty, could be a cause of uncertainty reduction rather than its effect, or could be indirectly related to uncertainty due to the influence of some third variable. While attraction seems to be in a stable, negative relationship with uncertainty, uncertainty need not be the cause of attraction, directly or indirectly. Inconsistent findings, reversed relationships, and weak correlations might result from any of these specification problems. Another alternative for the inconsistent and/or negligible results reported to date concerns the adequacy of the tests used to assess the correctness of the axioms. One means of determining the adequacy of the tests of the theory is to explore the extent to which these tests account for various assumptions underlying the axiomatic framework. The relationships among uncertainty level, information seeking, and liking (as with others posited in the theory) rest on the belief that the primary concern of interactants is predicting and explaining cointeractants' behavior. In other words, the theory presumes that individuals are motivated to reduce uncertainty. Recognizing that this presumption may not always be valid, Berger (1979) considered conditions that would elevate persons' concern for uncertainty reduction. Unfortunately, the theory was never recast with the role outlined that such intolerance for uncertainty might play. Such recasting of the theory seems appropriate as well as necessary.

The lack of any theoretical framework specifying how one's concern for uncertainty reduction might interrelate with one's uncertainty level makes the generation of predictions difficult. Presently, the axioms of the theory state relationships only in terms of one's uncertainty level, though any predictions made by the theory would somehow have to incorporate both one's uncertainty level and one's concern about reducing that uncertainty. Leaving concern for uncertainty reduction outside the axiomatic framework makes uncertainty reduction theory difficult to falsify. For example, it would be possible to argue that findings that failed to support the axioms or theorems could be the result of persons having little concern for reducing their uncertainty, thereby not acting in ways anticipated by the axiomatic structure of the theory. Sunnafrank (1986) argued that only about half of the tests of uncertainty reduction theory have lent it support. It is

presently impossible to determine if those tests failed because the theory was incorrectly specified or if the failure stemmed from concern for uncertainty reduction not being incorporated into the hypotheses that were tested.

Prior to rejecting the theory as being incorrect, it would seem prudent to determine whether concern for uncertainty reduction can account for the inconsistent and/or negligible results found in past research. Consequently, this research explores how persons' concern for uncertainty reduction might be incorporated into the axiomatic framework of uncertainty reduction theory. The analysis proceeds by first examining how persons might become concerned about reducing uncertainty, followed by an examination of how that concern can be integrated into the axiomatic framework of the theory.

CONCERN FOR UNCERTAINTY REDUCTION

General Thesis

In 1979, Berger offered a detailed analysis that separated one's uncertainty level from one's concern for its reduction. Berger's analysis explored why an individual may not know much about a sales person, a gas station attendant, or a bus driver and yet not undertake to reduce uncertainty. Specifically, Berger considered conditions that would elevate one's concern for uncertainty reduction regardless of one's uncertainty level. Berger identified three antecedents of heightened concern for uncertainty reduction: anticipation of future interaction, deviance, and incentive value. Concern for uncertainty reduction was said to increase when we expect to meet others again in the future, when they act deviantly, or when they can meet our needs; alternatively, persons with little incentive value, who act in socially appropriate ways, or who are unlikely to cross our paths again define precisely those for whom our concern for uncertainty reduction will be low. Berger argued for this position in two different, though interrelated ways: At certain points, Berger wrote that anticipation of future interaction, deviance, and incentive value are antecedents to concern for uncertainty reduction, while at other points they are claimed to be antecedents to awareness and monitoring of another's behavioral stream.¹ We feel that the most coherent interpretation of

these various statements would be that each antecedent heightens concern for uncertainty reduction which results in increased monitoring of the behavioral stream, an interpretation endorsed by Berger (personal communication, Spring 1988).

Interpreting the 1979 position as we just did brings its own problems, however. First, what is meant by monitoring is not entirely clear. When the term was initially introduced by Berger it was used interchangeably with the word "awareness." However, when each antecedent is justified, it is argued to heighten information seeking.² "Monitoring" and "awareness" do sound suspiciously like an interactive version of observationally based passive information seeking strategies (Berger, 1979). While monitoring may not be an interactive strategy for seeking information, it is possible it could be *used* in interactive contexts. Thus we believe that the central thesis of Berger's 1979 analysis should be stated as: Each antecedent (anticipation of future interaction, deviance, or incentive value) heightens one's concern for uncertainty reduction which results in increased information seeking (via observation/monitoring).

It is important to recognize, however, that Berger (1979) claimed that this increased monitoring/awareness/information seeking is due to heightened concern for uncertainty reduction, regardless of one's uncertainty level. The implications here are that increases in anticipation of future interaction, deviance, and incentive value should have no effect on one's beginning uncertainty level but should influence the rate at which uncertainty is reduced (Berger & Bradac, 1982).³ All else being equal, persons with more concern for uncertainty reduction should monitor conversational partners more carefully and, as a result, reduce their uncertainty more rapidly.

The general position can be summarized in the following statements, each to be tested as hypotheses in the studies reported here. For reasons to be provided later, we also prefer to refer to "concern for uncertainty reduction" as "tolerance for uncertainty" (concepts that are found to be equivalent to each other, though opposite in valence). The basic thesis that Berger (1979) articulated can be summarized in the following two hypotheses:

H1: As each antecedent increases, tolerance for uncertainty decreases.

H2: As tolerance for uncertainty decreases, monitoring increases.

If tolerance for uncertainty (i.e., concern for uncertainty reduction) moderates the effects of each antecedent on monitoring, then it is required that

H3: As each antecedent increases, one's monitoring increases.

H4: If tolerance for uncertainty were held constant, the correlation between the level of each antecedent and monitoring would be attenuated.

In addition, the previous discussion suggested that monitoring can be equated with information seeking. If monitoring is a type of information seeking strategy, then it is required that

H5: Monitoring and information seeking are highly and positively correlated.

H6: Hypotheses 2, 3, and 4 can be supported after substituting the word "monitoring" with "information seeking."

Finally, initial uncertainty levels should be unaffected by variations in any of the antecedents of tolerance for uncertainty. Thus

H7: Each antecedent is uncorrelated with level of uncertainty.

The three variables that have been identified as antecedents of tolerance for uncertainty have received varying degrees of examination and test. For unknown reasons, anticipation of future interaction has received the greatest examination in terms of the theory, deviance a small amount of examination, and incentive value virtually no examination. As a result, the extent to which each antecedent is a plausible cause of concern for uncertainty reduction as well as standing in the various relationships posited by the seven claims just presented is often based on indirect rather than direct evidence.

Anticipation of Future Interaction

Individuals anticipating future interaction can be argued to have lower tolerance levels for uncertainty (a higher concern for uncertainty reduction) as predicted by Hypothesis 1. Persons anticipating future interaction reported both more importance in finding out about a conversational partner (Douglas, 1984) and a stronger intent to en-

gage in uncertainty reduction (Douglas, 1990a). While evidence exists consistent with Hypothesis 3 that persons anticipating future interaction spend more time observing (monitoring) a target (Berscheid, Graziano, Monson, & Dermier, 1976), the evidence is less consistent in terms of the relationship between anticipation of future interaction and information seeking (Hypothesis 6). Some studies found that anticipation of future interaction leads persons to ask for and exchange qualitatively different types of information (Calabrese, 1975; Leone & Leone, 1983), while other studies reported minimal to no effect of anticipation of future interaction on information quantity or quality (Donzella, 1988; Douglas, 1987; Kellermann, 1986). As expected in Hypothesis 7, anticipation of future interaction did not affect initial uncertainty levels in one study (Kellermann, 1986), although another study (Berger & Douglas, 1981) found that it leads to perceptions of similarity, which Axiom 6 of the theory indicates should affect uncertainty levels.

Whether anticipation of future interaction leads persons to decrease their uncertainty more rapidly in comparison to persons not anticipating future interaction is also somewhat unclear. In one study, no such differential decreases in uncertainty were uncovered (Kellermann, 1986), although other studies reported that persons anticipating future interaction *felt* that they had learned more and had gotten to know more about their conversational partners (Douglas, 1990a; Miller, Norman, & Wright, 1978). Persons anticipating future interaction also recalled more about their conversational partners, provided more elaborate descriptions of them, and made more attributions about them (Berscheid et al., 1976; Douglas, 1990a; Harvey, Yarkin, Lightner, & Town, 1980). Consequently, it would seem that the literature provides some evidence (though at times it is inconsistent) that anticipation of future interaction is an antecedent of tolerance for uncertainty that operates in a manner at least somewhat consistent with theoretical expectations as outlined in Hypotheses 1 through 7. It should also be noted that persons anticipating future interaction with a target other typically try to present themselves in positive, friendly, and socially appropriate ways (Douglas, 1990a; Kiesler, 1969; Shaffer & Ogden, 1986; Shaffer, Ogden, & Wu, 1987) and tend to like the target other more (Berscheid et al., 1976; Darley & Berscheid, 1967; Layton & Insko, 1974) even if that person is negative or obnoxious (Berscheid, Boye, & Darley, 1968; Mirels & Mills, 1964; Tyler & Sears, 1977). Therefore, with some qualifications, some support exists for

Hypotheses 1 through 7 for the antecedent of anticipation of future interaction.

Deviance

Deviance is a second antecedent argued to determine one's tolerance for uncertainty. No work exists that directly tests whether deviance decreases one's tolerance for uncertainty (Hypothesis 1), although Berger (personal communication, Spring 1988) indicated that there may be times that deviance will fail to have an effect. The example provided by Berger in this instance is that of a deviant (e.g., mugger) approaching you on the streets of New York City; in such a case, one is expected to have a high tolerance for (or little to no concern for reducing) uncertainty. It is unclear when deviance will affect one's tolerance for uncertainty, as claimed in various writings (Berger, 1979; Berger & Bradac, 1982), and when it will not. One possibility is that deviance will affect one's tolerance for uncertainty when future interaction is anticipated and will have no effect when future interaction is not anticipated. Thus the deviant we might all stare at or retreat from in horrid fascination on the street (no future interaction anticipated) is unlikely to lead us to be highly concerned about reducing our uncertainty about the person, though, nonetheless, we might increase our monitoring of the person's behavior.

Suggestive evidence does exist in terms of the relationship between deviance and monitoring/information seeking (Hypotheses 3 and 6). Berger (1979) relied on Newton's (1973, 1976) work on unitization to argue that deviance increases monitoring of the behavioral stream; this work involved expected/predictable behaviors interrupted by unexpected/unpredictable behaviors and noted that persons "chunked" the interaction stream more finely in response to a violation in expectations. Berger also relied on Pyzczynski and Greenberg's (1981) research reporting that persons tend to seek information about others only when they violate expectations for their behavior. Planalp and Honeycutt's (1985) and Planalp et al.'s (1988) research on events that increase uncertainty in developed relationships could conceivably be viewed as focusing on deviance; many of the events participants reported could be defined as behavior that violated expectations and/or social norms. In this research, it was found that people did try to reduce their uncertainty by engaging in communication, much of which involved gathering information and advice both

directly from the relational partner and from friends. Consequently, some support is available for the relationship between deviance and monitoring/information seeking.

It is unclear whether deviance is unrelated to uncertainty (as predicted in Hypothesis 7). Deviance is often *defined* as unpredictability (Berger & Bradac, 1982; Berger, Gardner, Parks, Schulman, & Miller, 1976), which then, by definition of uncertainty, *must* increase uncertainty. This unpredictability is typically generated by violating a conversational norm. For example, Berger et al. (1976) reported on three studies where deviance was manipulated (improper number of compliments or inappropriate information sequencing) as was reciprocity in the information exchange (not considered a deviance manipulation in the studies though it could certainly be defined as a violation of a conversational norm). Clatterbuck's (1979) review of these studies led him to claim that deviance has little influence on uncertainty. Berger et al.'s (1976) review of these studies led to the conclusion that deviance affects persons' uncertainty about others (i.e., their ability to predict and explain behavior). If failure to engage in reciprocal behavior is an operationalization of deviance, then the results of these studies are fairly clear in supporting a relationship between deviance and uncertainty but are equivocal otherwise. It should also be noted that Clatterbuck (1979) defined deviant behavior as an example of behavioral dissimilarity, which, by use of Axiom 6, is theoretically expected to have an effect on uncertainty. Consequently, it is our belief that deviance will affect one's level of uncertainty even though this violates the general thesis offered by Berger (1979) and summarized in Hypothesis 7.

Finally, it should be recognized that deviant behavior is generally judged negatively (Berger et al., 1976; Gardner, 1976; Kiesler, Kiesler, & Pallack, 1967; Kiesler, 1969; Schulman, 1976). However, anticipation of future interaction with an "obnoxious" (deviant?) other tends to increase that person's attractiveness (Tyler & Sears, 1977). In sum, then, little direct support exists for the seven hypotheses previously generated and these hypotheses may not be fully supported by any test for the antecedent of deviance.

Incentive Value

The antecedent of incentive value has received virtually no attention and, as such, relies mainly on argumentative inference for its

"support" of each of the seven hypotheses. Incentive value is defined as the belief that other persons can satisfy certain needs that one has or serve as potential sources of support. Some confusion exists in the discussion of this antecedent of tolerance for uncertainty concerning whether incentive value is defined by outcome dependence (one inference possible from Berger, 1979) or outcome valence (the inference possible from Berger & Bradac, 1982) or both. Both outcome dependence and outcome valence have had a long history in the research of social psychologists, particularly in research on attraction, and both could potentially affect concern for uncertainty reduction. Given the importance that both outcome dependence and outcome valence have had in other related arenas, it seems prudent not to discard one in favor of the other until sufficient empirical work has been completed to justify this move.

Sunnafrank's (1986) reformulation of uncertainty reduction theory focused on outcome valence. In the reformulation, when expected outcomes are positive, information seeking and liking increase as uncertainty decreases; when expected outcomes are negative, however, opposite relationships are posited to hold. When expected outcome values are positive, Sunnafrank's reformulation makes predictions opposite to that of Axiom 3 and similar to that of Axiom 7, resulting in an opposite relationship to that of Theorem 17 of uncertainty reduction theory. While this reformulation is valuable for focusing discussion on the role that outcome value should have in the theory, it unfortunately limits the concept of incentive values to outcome valence and fails to incorporate other factors that might affect uncertainty reduction, such as deviance and/or anticipation of future interaction. However, within this restricted domain of outcome valence, the approaches offer very different perspectives on the role of incentive value. Berger (1979) argued that incentive value, along with deviance and anticipation of future interaction, affects one's tolerance for uncertainty rather than directly influencing the behaviors of the uncertainty reduction process. Sunnafrank (1986) argued that one particular type of incentive value determines the behaviors of the uncertainty reduction process.

Despite these competing claims about the role that incentive values should play in understanding interaction behavior (i.e., as an antecedent to tolerance for uncertainty or as an antecedent to information seeking and attraction), no tests exist assessing this difference in perspective. Nor does evidence exist about the relationship of incen-

tive value with monitoring, information seeking, or uncertainty. Consequently, it is impossible to determine the validity of the claims made by either Berger or Sunnafrank for the antecedent of incentive value.

MODELS FOR MOTIVATION TO REDUCE UNCERTAINTY

Anticipation of future interaction, deviance, and incentive value are all expected by uncertainty reduction theory to influence one's tolerance for uncertainty. The issue from the perspective of the theory then becomes one of how tolerance for uncertainty can be incorporated into the axiomatic framework that otherwise focuses on one's uncertainty level. Different approaches to integrating tolerance for uncertainty and level of uncertainty will be offered and tested. The general strategy for testing each of these approaches will be to determine if the posited relationships in Axioms 3 and 7 along with Theorem 17 receive stronger and more consistent support if concern for uncertainty reduction is integrated into the axiomatic framework of the theory than if such integration does not occur. Four different approaches of integration will be pursued: a scope condition approach, a replacement approach, a weighting approach, and a discrepancy approach. Upon testing, these models must be shown to be better at accounting for variance in information seeking and attraction than is level of uncertainty alone if the integration is to be successful. The "baseline" model is thus the set of predictions stemming from the axioms and theorems in the initial formulation of the theory.

Model 1: The Baseline Model

For the purposes of this research project, Axiom 3, Axiom 7, and Theorem 17 will serve as the baseline model for understanding uncertainty reduction during initial interactions. These axioms were selected as they have developed into the preeminent aspects of the theory. In addition, either tests of these axioms and theorems or acceptance of their results has been problematic. Furthermore, a critical difference between Sunnafrank's (1986) predicted outcome values approach and uncertainty reduction theory lies in the information seeking axiom and the information seeking/liking theorem (when expected outcome values are positive). Finally, the integrated model

can only be compared on the basis of outcomes of level of uncertainty as causes of level of uncertainty are not at issue in this research. The research question involves the reduction of uncertainty, that is, the effects of reduced uncertainty rather than the causes that lead to initial levels of uncertainty being high or low. The baseline model actually permits four predictions: Axiom 3, Axiom 7, Theorem 17, and a required implication. The required implication of these two axioms and the deduced theorem is that when uncertainty is partialled out of the relationship between information seeking and liking, the association between these two variables should be attenuated. Consequently, this model can be defined as follows:

Model 1 (baseline model)

1. As level of uncertainty increases, information seeking increases.
2. As level of uncertainty decreases, liking increases.
3. As information seeking increases, liking decreases.
4. When level of uncertainty is held constant, the association between information seeking and liking should be attenuated.

Model 2: The Scope Condition Model

The scope condition model argues that concern for uncertainty reduction is a boundary condition for uncertainty reduction theory. This approach would suggest that when tolerance for uncertainty is high, uncertainty reduction theory provides no information about the relationships between uncertainty, information seeking and liking. From this perspective, the postulated relationships are restricted to the domain of instances defined by low tolerance for uncertainty, that is, when persons are concerned about uncertainty reduction. When persons are unable to tolerate their uncertainty, they should be propelled to act as predicted by the seven axioms and 21 associated theorems. Model 2 might as easily be called the "magic moment" model as it implies that at some magic moment, determined by persons' tolerance for uncertainty, the axioms become true. To the extent that anticipation of future interaction, deviance, and incentive value are antecedents of tolerance for uncertainty, the scope condition model would also predict that the axioms and theorems of uncertainty reduction theory would hold when these incentive, deviance, or future interaction conditions are met, but not otherwise. This analysis would yield the following model:

Model 2 (scope condition model)

1. When tolerance for uncertainty is low, then as uncertainty increases, information seeking increases.
2. When tolerance for uncertainty is low, then as uncertainty increases, liking decreases.
3. When each antecedent is high, then as uncertainty increases, information seeking increases.
4. When each antecedent is high, then as uncertainty increases, liking increases.

The scope condition model accounts for the inconsistent and/or negligible results from past research on the grounds that the scope condition of the theory was not met; persons were willing to tolerate their uncertainty rather than preferring to reduce it. While this model is one of many plausible readings of Berger (1979), it is, by no means, the only plausible reading of that article or of other writings on tolerance for uncertainty (e.g., Berger & Bradac, 1982). Given that it is a plausible reading, it should be tested; however, its shortcomings should not be overlooked either. First, when tolerance for uncertainty is treated as a scope condition, the requirements for meeting the condition remain unclear. What is a low tolerance level or a high level of an antecedent? Second, this model does not really integrate tolerance for uncertainty into the axiomatic framework of the theory; rather, it leaves it outside the axiomatic structure as a scope condition, thus making it impossible for tolerance for uncertainty to influence any other variables directly or indirectly. For example, other types of *interactive* effects that might exist between one's uncertainty level and one's tolerance for that uncertainty are ignored. Both Kellermann (1984) and Bradac (1988) argued for such an interaction. Nonetheless, this model is important to test as it provides one possible approach to handling the role tolerance for uncertainty plays within the framework of uncertainty reduction theory.

Model 3: The Replacement Model

Perhaps the simplest approach for integrating tolerance for uncertainty into the axiomatic framework of uncertainty reduction theory is to argue that it should replace level of uncertainty as the central construct in the theory. In such a case, tolerance for uncertainty would be the sole determinant of such outcomes as information seeking and attraction. Rather than taking the perspective of "If you *don't* know,

then ask," this model suggests "If you *want* to know, then ask." Model 3 places the focus on persons' concern for uncertainty reduction rather than on their actual level of uncertainty. In fact, the model says that one's actual state of knowledge is irrelevant; all that is relevant is whether a person prefers to have more knowledge or not. This analysis yields the following model:

Model 3 (replacement model)

1. As each antecedent increases, one's tolerance for uncertainty decreases.
2. As tolerance for uncertainty decreases, information seeking increases.
3. As tolerance for uncertainty decreases, liking increases.
4. As each antecedent increases, information seeking increases.
5. As each antecedent increases, liking decreases.
6. If tolerance for uncertainty were held constant, the correlation between the level of the antecedent and information seeking would be attenuated.
7. If tolerance for uncertainty were held constant, the correlation between the level of the antecedent and attraction would be attenuated.

This replacement model provides one account of the inconsistent and negligible relationships found in past research for Axiom 3, Axiom 7, and Theorem 17. In the perspective of this model, the failure to control or measure tolerance for uncertainty lets it operate in an unpredictable manner in past research, yielding the inconsistent findings and low correlations. The replacement model also offers an advantage that the scope model does not: It places tolerance for uncertainty into the axiomatic framework of uncertainty reduction theory rather than leaving it outside the axiomatic framework as a boundary condition. However, once again, the replacement model ignores any interaction that might exist between one's level of uncertainty and one's tolerance for that uncertainty. Because it is unclear and unknown if such an interaction exists, parsimony argues for testing a model that does not involve this interaction to determine if, by itself, tolerance for uncertainty is capable of accounting for the observed effects.

Model 4: The Weighting Model

An alternative perspective to that of replacement or a scope condition is to weight one's level of uncertainty by one's concern for reducing it. As mentioned previously, both Kellermann (1984) and

Bradac (1988) suggested employing this weighting approach, Kellermann weighting by "importance of uncertainty" and Bradac weighting by "need for certainty," two constructs that are quite similar by nature and intent. The intuition being offered by this weighting model is that persons experiencing high uncertainty but placing little importance in its reduction would not engage in much uncertainty reduction while persons experiencing less uncertainty but believing its reduction is of utmost importance would engage in more uncertainty reduction. As will be proven shortly, importance for reducing uncertainty, need for certainty, and tolerance for uncertainty are synonymous constructs. Basically, these researchers are arguing for the following model:

Model 4 (weighting model)

Motivation to Reduce Uncertainty = Level of Uncertainty \times (inverted)
Tolerance for Uncertainty

1. As each antecedent increases, tolerance for uncertainty decreases.
2. As motivation to reduce uncertainty increases, information seeking increases.
3. As motivation to reduce uncertainty increases, attraction decreases.

This weighting model is similar in approach to that taken by numerous scholars addressing a wide variety of problems. It is quite common to weight attitudes and/or beliefs by their importance, positive reinforcers by their importance/strength, ability by effort, valence by expectancies, beliefs by motivation to comply, evaluation of traits by their likelihood, and so on. The numerous expectancy value, subjective expected utility, and other weighted averaging models attest to the power that such a weighting strategy has for integrating the likelihood or "level" of an event with its perceived importance.

Model 4 nicely incorporates past results on the relationship between the antecedents of tolerance for uncertainty as well as those for level of uncertainty. For example, consider holding the level of uncertainty constant. Then the necessary implication of this model is that decreases in tolerance for uncertainty will lead to a greater motivation to reduce uncertainty, which will increase information seeking and decrease liking. Similarly, if tolerance for uncertainty is held constant, then the theory returns to the original relationships specified in uncertainty reduction theory.

Certain assumptions do go hand in hand with this (as well as any other) weighting model, most prominent of which are (a) the presumption of nonlinear changes, and (b) the comparison of the extremes. The presumption of nonlinear changes examines the effects of equivalent levels of uncertainty and importance (inverted tolerance for uncertainty). On a scale of 0 to 1, when a person is near certain (say, .1) and the remaining uncertainty is unimportant to reduce (say, .1), then one's motivation to reduce uncertainty takes on a very low value (.01). By contrast, if one is moderately uncertain (say, .5) and it is moderately important to reduce that uncertainty (say, .5), then one's motivation to reduce uncertainty is not moderate but halfway between moderate and low (.25). Compare this to the case where one is very uncertain (say, .9) and it is very important to reduce that uncertainty (say, .9) which produces a very high motivation to reduce uncertainty (.81). The motivation to reduce uncertainty is over three times greater when both values are high than when both values are moderate, while the motivation to reduce uncertainty is 25 times greater when both values are moderate compared to low. Motivation to reduce uncertainty responds nonlinearly to changes in uncertainty and one's tolerance for it. A second assumption of this weighting approach can be seen by comparing when one is fairly certain (say, .1) and feels that it is extremely important to reduce that uncertainty (.9) versus quite uncertain (say, .9) though finding it unimportant to reduce that uncertainty (.1). In both cases, these extremes produce equivalent motivations to reduce uncertainty, although, intuitively, it seems that the first case should result in more motivation than the second.

Model 5: The Discrepancy Model

An alternative to this nonlinear model is to employ a difference equation approach that compares one's uncertainty level with one's tolerance for uncertainty. Whenever this difference is positive, motivation to reduce uncertainty would be positive. Whenever this difference is zero, one's uncertainty matches one's tolerance for uncertainty and no motivation for uncertainty reduction is generated. When this difference is negative, it is difficult to make a prediction: It is unclear whether there is a "negative" motivation to reduce uncertainty. On one hand, it could be argued that this negative motivation would translate into situations where individuals wanted to increase uncer-

tainty, perhaps for certain strategic purposes such as eliminating boredom, ending a relationship, or the like. On the other hand, it may simply be the case that when this difference is negative, the individual acts in a manner similar to the case where the difference was zero; that is, the individual is not motivated to reduce uncertainty. This model (along with the two variations for "negative motivation") makes the same predictions as Model 4 (the weighting model); the only difference between Model 4 and this model is in terms of the definition of motivation to reduce uncertainty. Consequently, this model can be stated as follows and makes the same claims as found in Model 4:

Model 5a. Motivation to Reduce Uncertainty =

Level of Uncertainty -

Tolerance for Uncertainty

Model 5b. Motivation to Reduce Uncertainty =

maximum {Level of Uncertainty -

Tolerance for Uncertainty, 0}

This discrepancy model accounts for the inconsistent and/or negligible findings of past research on uncertainty reduction theory by arguing that uncertainty reduction will occur when someone does not know as much as they want to know. In other words, when there is a discrepancy between one's level of uncertainty and the level of uncertainty that persons are willing to tolerate, then there is reason to engage in information seeking and to come to like the other person as uncertainty is reduced. Simply put, this model focuses on the difference between one's current state of knowledge and one's preferred state of knowledge about others.

This discrepancy model is also similar in approach to that taken by scholars addressing other issues. Perceived discrepancy is at the heart of social comparison theories in group communication, discrepancy arousal theories of involvement, and in forecasting profits (rewards minus costs) in social penetration theories. Social exchange theories regularly rely on discrepancy as a motivator of behavior, specifically the discrepancy between persons' comparison levels or outcomes (rewards/costs expected and received) and the alternatives which they opted not to pursue (rewards and costs forgone). When the comparison level for alternatives exceeds the level that one anticipates or actually achieves in current relationships, then motivation is said to exist to end or diminish the current social exchange in favor of more rewarding exchanges. Similarly, the discrepancy model described

here for motivation to reduce uncertainty suggests that information seeking and attraction are functions of the difference in current and preferred knowledge states.

One critical difference between Models 4 and 5 concerns the effect of similar uncertainty and tolerance levels on persons' motivation to reduce uncertainty. For example, a moderate level of both uncertainty (say, .5) and tolerance (say, .5) will yield a motivation to reduce uncertainty of zero in Model 5, while in Model 4, it yields a result approximately one-fourth of the distance between zero and total motivation to reduce uncertainty. Whenever one's uncertainty matches one's tolerance level, the discrepancy model predicts no motivation to reduce uncertainty, while the weighting model yields varying predictions dependent on the specific values ($.1 \times .1$, $.3 \times .3$, $.5 \times .5$, $.7 \times .7$, $.9 \times .9$, and so on).

Another difference between Models 4 and 5 involves instances when persons know more about others than they feel they need to know (i.e., when one's uncertainty level is lower than one's tolerance level). In this case, the discrepancy model suggests either that no uncertainty reduction will occur (Model 5b) or that attempts will be made to increase uncertainty (Model 5a). By contrast, Model 4 allows for uncertainty reduction processes to be engaged when people know more than they feel is necessary. For example, consider the case where a person is somewhat uncertain (say, .5) but can tolerate greater uncertainty (.6). The weighting model would predict a motivation to reduce uncertainty of .20 ($.5 \times [1 - .6] = .20$), while the discrepancy models would either indicate that no uncertainty reduction would occur or that attempts would be made to increase uncertainty.

As with the scope, replacement, and weighting models, no research exists to determine the value of a discrepancy model for integrating concern for uncertainty reduction into the framework of uncertainty reduction theory. Similarly, the research is rather sparse and/or non-existent in terms of those factors (anticipation of future interaction, deviance, incentive value) that might lead persons' to increase their concern for uncertainty reduction. Consequently, the research reported here seeks to remedy this situation by testing the claims made by Berger in 1979 as well as determining if integration of concern for uncertainty reduction into the framework of uncertainty reduction theory aids in accounting for initial interaction behavior. Specifically, the research reported here tests (a) the seven hypotheses stemming from Berger's (1979) analysis of antecedents to tolerance for uncer-

tainty, (b) the baseline model for information seeking and attraction stemming from the original presentation of uncertainty reduction theory (Berger & Calabrese, 1975), and (c) the four alternative models (scope, replacement, weighting, and discrepancy) for incorporating tolerance for uncertainty into the framework of uncertainty reduction theory. Three separate studies were conducted, each manipulating one of the three antecedents of tolerance for uncertainty (anticipation of future interaction, deviance, and incentive value). As the same sets of tests are conducted in each study, the description of the studies' methodology and results will be provided at one time, rather than repeated for each study separately.

METHODOLOGY

Three studies were conducted. Study 1 examined anticipation of future interaction as an antecedent of tolerance for uncertainty, Study 2 examined the antecedent of deviance, and Study 3 examined the antecedent of incentive value. Each of these antecedents should operate as per the seven hypotheses extracted from Berger's (1979) analysis. In addition, each of the three studies tested the models (baseline, scope, replacement, weighting, and discrepancy) for integrating tolerance for uncertainty into uncertainty reduction theory. For purposes of generalizability, each study employed four different initial interaction settings (called scenarios) in which all tests were conducted. Thus four tests were conducted assessing the role of each antecedent (anticipation of future interaction, deviance, or incentive value) in elevating concern for uncertainty reduction, while 12 tests were conducted assessing the value of each of the models for integrating that concern into the framework of the theory (4 scenarios per study \times 3 studies). The scenarios were presented in written form to participants along with scales designed to measure their level of uncertainty, tolerance for uncertainty, importance of reducing uncertainty, need for certainty, monitoring, information seeking, attraction, and the relevant antecedent (anticipation of future interaction, deviance, or incentive value).

Construction of Scenarios

In Study 1, four scenarios were employed where anticipation of future interaction was varied (high, moderate, or low) and where the

nature of that future interaction occurred in social as well as task settings. Each of these scenarios provided a description of a setting involving an initial interaction between the study participant and another person. The four scenarios, labeled trip, party, summer institute, and job interview, are described in Table 1. The extent of future interaction with the target other was varied by altering the certainty with which future meetings would occur. Scenarios also varied in whether this future interaction would be certain over a short (trip or summer institute) or long (party or job interview) period in the future.

In Study 2, the four scenarios employed were labeled amusement park, devil worship, church sermon, and restaurant; their details are described in Table 1. In each of these scenarios, deviance in behavior was varied (high, moderate, or low) with a focus toward avoiding serious outcomes from the deviance. Behavioral deviance was varied by altering the extent of norm violation and included falling asleep by stretching out on a pew and snoring during a church sermon; showing up at an amusement park in a three-piece suit, a tie, and wing tip shoes; asking off-the-wall questions to a waitress; and revealing that one is a Satanist. Furthermore, two of the scenarios (amusement park and devil worship) specified that future interaction could be anticipated, while the other two depressed this expectation.

The four scenarios employed in Study 3 were labeled bar, ride to work, laundromat, and scholarship and are described in Table 1. In each of these scenarios, incentive value of the target other was varied (high, moderate, or low), such that the incentive concerned material (ride to work and scholarship) as well as emotional (bar and laundromat) rewards. Incentive value was varied by altering the extent to which a target person could satisfy an individual's needs, with such incentives being offered as companionship for a night, a ride to work, friendship, and a recommendation letter. In other words, each of these incentives falls within the domain of a positive outcome value; the manipulation varies the degree to which the outcome is likely to occur while holding the positive valence of the outcome constant.

For each of the 12 scenarios, we were concerned with obtaining sufficient variation in motivation to reduce uncertainty so that adequate tests could be conducted that would not need to be qualified by restrictions in range. Across tests and models, this required that sufficient variation exist not only in persons' tolerance for uncertainty but in their level of uncertainty. Varying the level of each antecedent (as just described) should theoretically provide sufficient variation in

TABLE 1
Description of Scenarios in Each of the Three Studies

Scenario	Variation in Uncertainty	Variation in Antecedent
Study 1: Future interaction		
<i>Trip</i> You are on a group tour in Europe. There is a side trip in Paris your friend doesn't want to take and pairs are required. Another person from another tour group also wants to take the side trip. This person has also requested to finish the last 3 weeks of the tour with your tour group.	The background information sheet in the tour guide's packet is missing so nothing can be learned in advance about the other, the sheet is present and you're given biographic information, or the tour guide knows and tells you about person.	Person's request to finish the last 3 weeks of tour was denied, has received no decision, or has been granted.
<i>Party</i> The host of a party (your friend) introduces you to another person.	The host gives you no details, tells a few things, or tells you all about the person.	The person is on a rare trip to the area, visits the area from time to time, or is going to be your new neighbor.
<i>Summer institute</i> You are at a summer institute where you work with a partner. You do not see other people at the institute unless they are your partner.	Partners are randomly assigned with no way of learning about the person in advance, partially matched on similarity and you are provided some information, or matched extensively and you are given much information.	Partners do not change during the 4 weeks, partners change with a chance of being paired together again, or partners change with no chance of being paired together again.
<i>Job interview</i> You are at the second interview with a company that will add one person to each of three different offices. You will be interviewed by one of the three supervisors. You are guaranteed one of the three positions.	You have been able to learn nothing, some, or a great deal about the supervisor.	You have little, moderate, or a high chance of working for this particular supervisor.

Study 2: Deviance

Amusement park

You are meeting a distant cousin at a nearby amusement park because he will be going to your college next year. You met your cousin only once many years ago.

Your relatives have told you very little, some, or a great deal about your cousin.

Your cousin shows up wearing blue jeans, T-shirt and tennis shoes, the same with wing tip shoes, or a three-piece suit, tie, and wing tip shoes.

Devil worship

Students have done oral presentations for a class on interests, values, hobbies, and now must do one on beliefs.

One student has disclosed nothing, some information, or a great deal of information and you are unsure about, feel somewhat or feel very similar to the student.

The student does the report on being a Lutheran, a Buddhist, or a Satanist.

Church sermon

You and a friend are at church. Your friend points out a gentleman in one of the pews to you.

Your friend says the gentleman is new to the church, or has met him a couple of times, or knows him quite well and tells you what is known.

The gentleman is uncomfortable in the pew, falls asleep with his head back, or snores and stretches out in the pew to sleep.

Restaurant

A group of people is at a restaurant. One person you have never met previously asks the waitress questions. The group will eat out again next week.

Person asks the waitress six questions about the menu/food (soup, vegetable, and so on), three questions about menu/food and three "strange" questions (color of carpet, if sky is outside, and so on), or asks six strange questions (professional mud wrestler?, available bedpan?, and so on).

(continued)

TABLE 1 Continued

Scenario	Variation in Uncertainty	Variation in Antecedent
Study 3: Incentive value		
<i>Bar</i>	You go to a bar because you don't want to spend the night alone. A person of the opposite sex sits next to you.	The bartender, who is a friend can tell you nothing, a few things, or quite a bit about the person and you feel unsure about, somewhat or very similar to the person.
<i>Ride to work</i>	Your car is broken down and you need to get to your new job. While talking to a friend, your friend introduces you to another person who works at the same place.	The person came in alone, with someone who has been gone for 1/2 hour, or with someone who will be back.
<i>Laundromat</i>	You are lonely. You overhear a couple talking at the laundromat.	The friend tells you only that the person works there, gives some general information (biographic), or gives quite a bit of attitudinal information about the person.
<i>Scholarship</i>	You want a scholarship and need a professor to sponsor you. Eligible sponsors are rotated each year.	The couple knows no one (new to area), just had a good friend move away and might want to meet someone new, or still has too many friends and social obligations.
		The professor is not, may be, or is eligible to be your sponsor.

tolerance for uncertainty so as to cover the full range of values (from very high to very low). However, some of the models to be tested also require that persons' level of uncertainty range from high to low. Consequently, we varied the level of uncertainty within each scenario by providing varying quantities (a little, some, or a lot) of information and making that information yield varying degrees of similarity (very little, some, or a great deal) with the study participant. Both of these variables have been posited as causes of one's level of uncertainty (Berger, 1987; Berger & Calabrese, 1975). Table 1 also describes these variations. The following is an example of a scenario in Study 2 on deviance where the version of the scenario is written to be high in deviance and high in uncertainty:

You are going out to dinner at an expensive five-star French restaurant with a group of people, some of whom you know and some of whom you don't know. Everyone will also be going to a fine seafood restaurant next week. On the way over to the French restaurant with a friend, the friend only has time to tell you the names of the people who will be there that you don't know. Shortly after being seated, however, one person in the group, whom you hadn't met previously but with whom you are getting a ride home, starts quizzing the waitress about the reason for the color of the carpet in the restaurant, her choice of hairstyles, whether she would dance on the tabletop, whether she would look out the window and see if there was any sky outside, whether the waitress had a bedpan she could bring to the table, and whether the waitress had ever wanted to be a professional mud wrestler. Your friend had told you very little about this person—though you will be riding home with the person—and you are quite taken aback by the person asking these questions.

It should be noted that this version of the scenario was meant to be high in deviance, that is, involve nonnormative behavior, as must all the "high" deviance conditions. The "low" deviance versions of these scenarios are normative (as they should be), as are the scenarios involved in Study 1 (anticipation of future interaction) and Study 3 (incentive value).

Participants

Participants were 1,159 students at 10 universities selected from across the United States.⁴ Study 1 involved 380 participants, Study 2 involved 372, and Study 3 involved 407. Students from at least five of the selected universities served as participants for each of the 12 scenarios by reading the stimulus scenario provided and then answer-

ing questions designed to measure their level of uncertainty, tolerance for uncertainty, importance of uncertainty, need for certainty, information seeking, attraction, monitoring, and the relevant antecedent (anticipation of future interaction, deviance, or incentive value).

Measurement

Factor analyses and reliability analyses were conducted on each measure for each study. In all factor analyses, the items were found to be intercorrelated (the vast majority of correlations were greater than .3, Bartlett's test of sphericity was significant, and the Kaiser-Meyer-Olkin measures of sampling adequacy, overall and by item, tended to be in the excellent—.8 to .9—range). In addition, the expected unidimensional structure was verified for each measurement scale on the basis of eigenvalues and scree tests after removal of any "bad" items. Finally, the sum of the absolute value of the deviations between reproduced and actual correlations was generally .05 or less.

Uncertainty Level and Tolerance for Uncertainty

A slight variation of CLUES7 (Clatterbuck, 1979) was employed to measure level of uncertainty. The CLUES7 scale measures attributional confidence and has been employed in virtually all past research as an inverted measure of uncertainty. In addition to the seven items typically on this measure, we chose to add one item that Gudykunst and Nishida (1986) suggested (i.e., How well do you think you understand the person?). In part, this eighth item was added because we were skeptical of certain items on the scale (one's general ability to predict others, one's ability to predict the target's liking for oneself, and one's ability to empathize with the target). Gudykunst and Nishida (1986) reported some problems with those items. Table 2 provides a list of the items used as well as factor loadings and reliability information for each study considered separately. Across the three studies, uncertainty was measured quite reliably (alphas ranged from .87 to .91). As suspected, Items 1, 2, and 6 did not add substantially to the measurement of uncertainty and, at times, could even be said to detract from its measurement.

Tolerance for uncertainty, like level of uncertainty, was measured by writing items about its opposite, or "threshold for certainty." Each item employed on the 8-item uncertainty scale was revised to measure

TABLE 2
Measurement Scale for Level of Uncertainty

Item	Future Interaction		Deviance		Incentive Value	
	LDG	REL	LDG	REL	LDG	REL
1. How confident are you of your general ability to predict how the person will behave? (R)	.68	.90	.64	.86	.63	.86
2. How certain are you about how well the person likes you? (R)	.66	.90	.63	.86	.65	.86
3. How accurate do you think you are at predicting the values the person holds? (R)	.79	.89	.61	.86	.71	.86
4. How accurate do you think you are at predicting the person's attitudes? (R)	.79	.89	.70	.85	.76	.85
5. How well do you think you can predict the person's feelings and emotions? (R)	.79	.89	.73	.85	.75	.85
6. How much do you think you can empathize (share) the way the person feels about him/herself as a person? (R)	.59	.90	.60	.86	.49	.88
7. How well do you think you know the person? (R)	.79	.89	.76	.85	.73	.85
8. How well do you think you understand the person? (R)	.81	.88	.74	.85	.74	.85
Without "K"						
Theoretic minimum	8		8		8	
Theoretic maximum	56		56		56	
Theoretic mean	32		32		32	
Actual mean	33		36		33	
Standard deviation	9		8		8	
Reliability (alpha)	.90		.87		.87	
With "K"						
Theoretic minimum	9		9		9	
Theoretic maximum	63		63		63	
Theoretic mean	36		36		36	
Actual mean	38		41		38	
Standard deviation	10		9		9	
Reliability (alpha)	.91		.89		.88	

NOTE: LDG refers to the factor loading; REL is what alpha would be if the item were deleted; (R) identifies items that were recorded / flipped in scoring.

one's *need* instead of one's *ability* to make predictions or generate explanations for another's behavior. These items are listed in Table 3 and, on the packet given participants, were interleaved with the uncertainty items so that respondents could clearly differentiate questions asking about their ability and their need. Tolerance for uncertainty was also measured quite reliably (alpha ranged from .88 to .92). Given the use of CLUES as a base from which to generate this scale, Items 1, 2, and 6 again appeared to be somewhat suspect measures of tolerance for uncertainty.

Because the CLUES scale is scored with no items being reversed, we also chose to measure uncertainty level and tolerance for uncertainty in a completely different manner to obtain a check on the scoring problems inherently associated with the use of CLUES. A 25-point scale was provided where participants were requested to place a "K" along a line that represented how well they thought they knew the target person. Participants were also asked to place an "N" along the same line (to the left of, on top of, or to the right of the "K") representing how well they thought they needed to know the target person. Without fail, each of these items always correlated highly (.52 to .71) with its respective measure and, consequently, was added to the relevant measure after suitable transformation into the same scale as each of the initial eight items. Tables 2 and 3 provide scale information (mean, variance, reliability, and theoretical minimum, maximum, and mean) for level of uncertainty and tolerance for uncertainty.

As other researchers had employed terms which we thought would be identical to tolerance for uncertainty (e.g., need for certainty and importance of uncertainty), we sought to measure each of these constructs. Table 4 lists the items used in these scales. We defined importance of reducing uncertainty to be concerned with the significance of what one did not know about the target person and need for certainty to reflect one's need or want for better understanding of or ability to predict the target person. As can be determined from Table 4, both scales were reasonably reliable (alphas ranged from .70 to .80). More important is the fact that high intercorrelations among tolerance for uncertainty, importance of uncertainty, and need for certainty (.48 to .82) suggest that the scales were measuring the same quality. Factor and reliability analyses of the 21 combined items revealed a unidimensional structure based on eigenvalues, scree tests, and factor loadings. Rather than combining all 21 items after adjustments for

TABLE 3
Measurement Scale for Tolerance for Uncertainty

Item	Future Interaction		Deviance		Incentive Value	
	LDG	REL	LDG	REL	LDG	REL
1. How confident do you feel you need to be in your general ability to predict how the person will behave? (R)	.54	.89	.60	.91	.48	.88
2. How certain do you need to be about how well the person likes you? (R)	.63	.88	.66	.90	.63	.87
3. How accurate do you think you need to be at predicting the values the person holds? (R)	.75	.87	.81	.89	.77	.86
4. How accurate do you think you need to be at predicting the person's attitudes? (R)	.81	.86	.83	.89	.76	.86
5. How well do you think you need to be able to predict the person's feelings' and emotions? (R)	.73	.87	.85	.89	.77	.86
6. How much do you think you need to be able to empathize (share) the way the person feels about him/herself as a person? (R)	.54	.89	.63	.90	.63	.87
7. How well do you think you need to know the person? (R)	.79	.86	.75	.89	.72	.86
8. How well do you think you need to understand the person? (R)	.82	.86	.80	.89	.78	.86
Without "N"						
Theoretic minimum	8		8		8	
Theoretic maximum	56		56		56	
Theoretic mean	32		32		32	
Actual mean	29		32		28	
Standard deviation	9		10		9	
Reliability (alpha)	.89		.91		.88	
With "N"						
Theoretic minimum	9		9		9	
Theoretic maximum	63		63		63	
Theoretic mean	36		36		36	
Actual mean	33		37		32	
Standard deviation	10		11		10	
Reliability (alpha)	.90		.92		.88	

NOTE: LDG refers to the factor loading; REL is what alpha would be if the item were deleted; (R) identifies items that were recoded/ flipped in scoring.

TABLE 4
Measurement Scale for Importance and Need for Certainty

Item	Future Interaction			Deviance			Incentive Value		
	LDG	REL		LDG	REL		LDG	REL	
Importance									
1. What I don't know about the person doesn't really matter. (R)	.68	.73		.68	.76		.66	.70	
2. I believe it is of real importance for me to understand the person better than I presently do.	.66	.73		.83	.73		.61	.71	
3. I may not understand the person well, but that's o.k. (R)	.61	.74		.57	.78		.54	.72	
4. Any uncertainty I might have about how the person might act really bothers me.	.53	.76		.44	.80		.48	.73	
5. While the person has attitudes and opinions I don't know, I really don't care much about them. (R)	.55	.75		.63	.77		.58	.72	
6. What I don't know about the person is important for me to know.	.61	.74		.64	.77		.61	.71	
Theoretic minimum = 6 Actual mean 20 18 20									
Theoretic maximum = 30 Standard deviation 4 4 4									
Theoretic mean = 18 Reliability (alpha) .78 .80 .75									
Need for certainty									
1. It would really bother me if the person did something I couldn't understand.	.44	.73		.42	.78		.44	.69	
2. I have no real need to anticipate how the person will act. (R)	.60	.69		.67	.71		.60	.64	
3. I truly need to get to know the person considerably better than I do.	.65	.67		.70	.70		.61	.64	
4. It wouldn't matter to me if the person acted a little bit weird. (R)	.30	.73		.38	.77		.33	.70	
5. I want to be certain about how the person would act when I talked with him/her.	.60	.69		.59	.73		.56	.65	
6. It's not necessary to know much about the person. (R)	.70	.66		.77	.69		.64	.64	
Theoretic minimum = 5 Actual mean 17 16 17									
Theoretic maximum = 25 Standard deviation 3 3 3									
Theoretic mean = 15 Reliability (alpha) .73 .77 .70									

NOTE: LDG refers to the factor loading; REL is what alpha would be if the item were deleted; (R) identifies items that were recoded/ flipped in scoring; brackets around loadings/alphas indicate that the item was deleted from the scale.

different measurement scales, it was decided that the tolerance for uncertainty measure would be employed for the sake of simplicity and parsimony (as well as those items loading the highest in the combined factor solution).

Monitoring and Information Seeking

Separate scales were developed to measure monitoring and information seeking. Items tapping the extent to which individuals monitor their partners' behavior were written focusing on the degree of concentration or attention directed toward the target's behavior. Great care was taken to write the monitoring items so that they did not presume the occurrence of information seeking. A separate measure of information seeking was constructed, with items written in such a way to insure that the variety of information seeking strategies (Berger & Kellermann, in press) would be represented with the exception of observational strategies (to prevent any inherent confound with monitoring). Table 5 lists the items in the monitoring and information seeking scales. Both monitoring and information seeking were measured reliably (alphas ranging from .78 to .85), although Item 4 in the monitoring scale was marginal and had to be eliminated in Study 3. Similarly, Item 5 in the information seeking scale was also of marginal value and also had to be eliminated in Study 3.

Attraction

The six items comprising the attraction scale are provided in Table 6. Item 4 (The person and I may not get along) proved to be unreliable and was deleted from the analysis of all three studies. The remaining 5-item scale measured attraction reliably (alphas ranged from .77 to .88).

Antecedents of Tolerance

Four-item scales were developed to measure anticipation of future interaction, deviance, and incentive value. Table 7 lists the items in each of these scales. Each of these antecedents of tolerance for uncertainty was measured reliably (alphas ranged from .81 to .86).

TABLE 5
Measurement Scale for Information Seeking and Monitoring

Item	Future Interaction		Deviance		Incentive Value	
	LDG	REL	LDG	REL	LDG	REL
Monitoring						
1. I would be very observant of what the person did when I talked with him/her.	.71	.77	.65	.79	.68	.72
2. I probably wouldn't concentrate extensively on how the person acted when I talked with him/her. (R)	.66	.78	.61	.80	.57	.74
3. I would monitor the person's behavior closely when I talked with him/her.	.79	.75	.78	.77	.77	.69
4. Despite appearances, I wouldn't pay complete attention to the person's behavior when I talked with him/her. (R)	.46	.81	.51	.82	[.34]	[.77]
5. I would carefully watch how the person responded to me when I talked with him/her.	.70	.77	.77	.78	.74	.71
6. I wouldn't be highly concerned with the person's behavior when I talked with him/her. (R)	.58	.79	.65	.79	.49	.77
Theoretic minimum = 6/5	23		22		20	
Actual mean	4		4		3	
Theoretic maximum = 30/25						
Standard deviation						
Theoretic mean = 18/15	.81		.83		.78	
Information seeking						
1. I would ask the person a number of questions about him/herself.	.68	.76	.75	.82	.68	.75
2. I wouldn't seek out information about the person. (R)	.59	.78	.65	.83	.57	.78
3. I would try to find out more about the person.	.70	.76	.80	.81	.78	.74
4. I wouldn't ask the person for more information about him/herself. (R)	.74	.75	.82	.80	.76	.73
5. I would ask others about the person.	.46	.80	.52	.85	[.29]	[.79]
6. I wouldn't encourage the person to tell me about him/herself. (R)	.67	.77	.66	.83	.54	.78
Theoretic minimum = 6/5	23		22		19	
Actual mean	4		4		3	
Theoretic maximum = 30/25						
Standard deviation						
Theoretic mean = 18/15	.80		.85		.79	

NOTE: LDG refers to the factor loading; REL is what alpha would be if the item were deleted; (R) identifies items that were recoded/ flipped in scoring; brackets around loadings/alphas indicate that the item was deleted from the scale.

TABLE 6
Measurement Scale for Attraction

Item	Future Interaction		Deviance		Interactive Value	
	LDG	REL	LDG	REL	LDG	REL
1. This person is probably someone I would like.	.61	.74	.78	.86	.62	.75
2. I'm not particularly attracted to the person. (R)	.42	.79	.65	.88	[.37]	[.71]
3. Most likely, the person is a nice person.	.85	.69	.80	.85	.74	.68
4. The person and I may not get along. (R)	[.21]	[.77]	[.47]	[.88]	[.25]	[.75]
5. I think the person is probably a pleasant person. (R)	.85	.70	.84	.85	.83	.66
6. I don't believe the person will be very appealing as a person. (R)	.53	.77	.83	.84	.58	.76
Theoretic minimum	5		5		4	
Theoretic maximum	25		25		20	
Theoretic mean	15		15		12	
Actual mean	17		16		14	
Standard deviation	2		3		2	
Reliability (alpha)	.78		.88		.77	

NOTE: LDG refers to the factor loading; REL is what alpha would be if the item were deleted; (R) identifies items that were recoded / flipped in scoring; brackets around loadings / alphas indicate that the item was deleted from the scale.

TABLE 7
Measurement Scales for Antecedents

Item		Future Interaction		Deviance		Interactive Value	
		LDG	REL	LDG	REL	LDG	REL
Anticipation of future interaction							
1.	I will probably see the person often in the future.	.83	.78				
2.	I don't know when I will see the person again. (R)	.67	.83				
3.	My next opportunity to see the person again will come soon.	.81	.79				
4.	This is probably the only time I'll talk with the person. (R)	.75	.80				
	Theoretic minimum = 4		12				
	Theoretic maximum = 20		3				
	Theoretic mean = 12		.84				
Deviance							
1.	I think this person's behavior is deviant.			.66	.79		
2.	This person acts in a pretty typical way. (R)			.75	.76		
3.	I think this person is a bit strange.			.70	.76		
4.	This person acts like people normally do. (R)			.77	.75		
	Theoretic minimum = 4			13			
	Theoretic maximum = 20			3			
	Theoretic mean = 12			.81			
						.72	.84
						.84	.79
						.67	.85
						.90	.78
Incentive value							
1.	This person can help me get what I want.						
2.	This person has nothing to offer me. (R)						
3.	I think this person would be valuable to talk to.						
4.	This person really can't do anything for me. (R)						
	Theoretic minimum = 4					15	
	Theoretic maximum = 20					3	
	Theoretic mean = 12					.86	

NOTE: LDG refers to the factor loading; REL is what alpha would be if the item were deleted; (R) identifies items that were recoded/flipped in scoring; brackets around loadings/alphas indicate that the item was deleted from the scale.

Procedures

Each participant was provided a booklet from one of the studies, the first page of which contained general instructions for the study as well as a stimulus scenario varying in one of the antecedents (high, moderate, or low) and level of uncertainty (high, moderate, or low). Participants were encouraged to read the stimulus scenario carefully and to feel free to reference it at any point while completing the questions that followed. After reading the scenario, participants then completed each of the measures (items were interspersed) of interest. The packets typically required from 10 to 15 minutes to complete. Participants were then thanked for their participation.

RESULTS

Distributions of Variables

Antecedents of Tolerance

In each scenario, it was expected that by manipulating the antecedent (anticipation of future interaction in Study 1, deviance in Study 2, and incentive value in Study 3), sufficient variation would ensue so that the full range of expectations of future interaction, perceptions of deviance, and forecasts of incentive values would be represented. The distribution of scores reported for the antecedent manipulated in each of the scenarios was examined to determine if any restrictions in range occurred. Table 8 summarizes the results for each scenario in each of the three studies. One-way ANOVAs of the perception of the antecedent by its manipulated level revealed that in all cases but one (the scholarship scenario in Study 3), a range of levels of the antecedent was induced by the manipulations manifested in the scenarios (significant F s ranged from 4.88 to 19.66, $p < .01$ to $.001$; F for the scholarship scenario = 2.14, n.s.). Tests conducted on the scholarship scenario will reflect a restriction in range when employing the incentive value variable ($M = 17.05$, $SD = 2.21$). However, this restriction in range did not affect all tests reported for the scholarship scenario; rather, it affected only those tests for the scholarship scenario where the antecedent of incentive value was involved. Other tests conducted for the

TABLE 8
Variation in the Antecedent

Scenario	Means			F	df	eta ²	r	Mean	SD	Min	Max	Kurt. z	Skew z
	Low	Moderate	High										
Future interaction													
Trip	8.67	10.30	12.46	19.66***	2,82	.32	.57	10.44	2.78	4	16	N	-N
Party	7.35	11.72	13.94	70.33***	2,93	.60	.76	11.07	3.53	4	18	-N	-N
Institute	9.90	11.27	12.58	11.53***	2,94	.20	.44	11.28	2.46	4	17	N	-N
Job interview	12.12	12.51	14.59	11.09***	2,98	.18	.40	13.04	2.51	7	20	-N	N
Deviance													
Amusement park	9.46	11.54	13.10	20.07***	2,82	.33	.57	11.47	2.60	6	19	-N	N
Devil worship	10.52	10.73	14.48	29.23***	2,87	.40	.56	11.96	2.91	4	19	-N	N
Church sermon	11.25	11.50	15.50	34.38***	2,91	.43	.59	12.78	3.00	7	20	-N	N
Restaurant	11.48	14.63	16.47	38.15***	2,90	.46	.67	14.22	3.08	7	20	-N	N
Incentive value													
Bar	12.06	12.52	13.97	5.91**	2,97	.11	.32	12.87	2.48	5	19	N	-N
Ride to work	14.20	16.52	17.09	11.65***	2,99	.19	.41	15.91	2.90	6	20	3.76	-4.51
Laundromat	12.63	13.97	14.68	4.88**	2,97	.09	.30	13.77	2.83	5	19	N	-N
Scholarship	16.43	17.21	17.47	2.14	2,101	.04	.19	17.04	2.21	6	20	9.95	-5.46
Theoretic values:													
								12.00		4	20	<3	0

NOTE: Negative z scores for kurtosis indicate a flat distribution while "N" means normal with the direction of the bias noted. Negative z scores for skewness indicate a negatively skewed distribution.

* $p < .05$; ** $p < .01$; *** $p < .001$.

scholarship scenario as well as the tests for the other 11 scenarios were relatively free of restrictions in range.

It is useful, however, to recognize some of the tendencies in the distributions of each of the antecedents. While the four scenarios in Study 1 (anticipation of future interaction) and the four in Study 2 (deviance) generated distributions of perceptions of the antecedent that were more or less centered around the theoretic mean of the scale (theoretic mean = 12), the four scenarios in Study 3 (incentive value) tended to be centered somewhat higher than the theoretic mean. To some degree, this may simply reflect the fact that people tend to see others as having inherent value or of being of value to them. Despite a target other being unable to provide a ride to work (in the ride scenario) or a recommendation letter (in the scholarship scenario), persons still felt that these target others were of value to know and/or had something to offer. (As a side note, it is heartening to learn from these results that professors—the target in the scholarship scenario—have great incentive value to participants even when they cannot write a recommendation letter for them!) For the most part, the distributions of perceptions of each of the antecedents reflected large standard deviations, minimum and maximum values at or near the theoretic minimum and maximum values, distributions that were normal or flat in terms of kurtosis (i.e., flat distributions reflected values of the antecedent that were more evenly distributed across the range of values), and normally distributed in terms of skewness. Examination of these distributional tendencies in Table 8 suggests that the ride scenario in Study 3 (incentive value) evidenced somewhat elevated expectations as to the value of meeting the target other even though there was fairly good variation in perceptions as to that value. Basically, the variations in perceptions of the value that others might have or provide suggest that persons are expecting positive outcomes.

Across the three studies, the deviance manipulations produced the most consistent and strong variations in perceptions, as can be determined from the effect size estimates as well as the distributional information in Table 8. However, except as noted for the scholarship scenario in Study 3, good variation seemed to exist in perceptions of the antecedent in each of the scenarios. If any bias existed in perceptions of these antecedents to tolerance for uncertainty, it was toward times when persons are concerned about uncertainty reduction and away from times when uncertainty reduction would be less likely to occur. From these analyses, we can conclude that variation of the

antecedent occurred as desired for each of the four scenarios in Study 1 and Study 2 and for three of the four scenarios in Study 3.

Variables in the Models

Not only were we concerned that the full range of values be obtained for the three antecedents (in each of their four scenarios), but we also wanted this variation for particular variables of interest (level of uncertainty, tolerance for uncertainty, and motivation to reduce uncertainty achieved through weighting or difference equations). Table 9 summarizes the assessment of these distributions in terms of their means, standard deviations, minimum value, maximum value, kurtosis, and skewness. As before, we would prefer that the distributions of these variables have means near the theoretic value, large standard deviations, minimum and maximum values at or near the theoretic minimum and maximum values, the distribution to be normal to flat in terms of kurtosis, and normally distributed in terms of skewness. It is fully anticipated however, that when motivation to reduce uncertainty is defined as the positive difference between uncertainty level and tolerance for uncertainty, taking on values of zero otherwise (Model 5b) or when motivation to reduce uncertainty is a weighted function of level of uncertainty (Model 4), then the distribution of motivation to reduce uncertainty will virtually be assured of being skewed and is less likely to be platykurtic (flat) as desired.

As can be seen in Table 9, one's uncertainty level is near or above the theoretic mean in each scenario and each study, and, in a most interesting outcome, is consistently above the mean tolerance for uncertainty. Such a finding suggests that people typically are more uncertain than they prefer to be, supporting a basic tenet of uncertainty reduction theory that individuals are generally motivated to reduce uncertainty. Both level of uncertainty and tolerance for uncertainty were normally distributed across the four scenarios in each of the three studies, with deviations occurring in the preferred direction of "flatness." The range of each of these variables tended toward the theoretic limits, although the interview scenario in the anticipation of future interaction study evidenced the greatest restriction in range with persons failing to be highly uncertain about the target (a supervisor). Tolerance for uncertainty was never extremely high in the institute scenario of Study 1, although in all other cases, it was at or near the theoretic maximum and minimum.

TABLE 9
Distributinal Information for Uncertainty and Motivation

Statistic	Theoretic Value	Future Interaction					Deviance					Incentive Value				
		Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	School			
Uncertainty (Model 1)	\bar{X}	41.56	40.52	35.88	35.67	40.18	39.18	45.08	40.96	38.75	39.98	40.31	33.70			
	SD	11.86	10.77	9.00	7.73	8.36	10.81	9.04	8.51	9.11	9.16	8.68	9.04			
	min	17.25	17.00	19.50	22.00	22.50	19.50	22.00	24.00	18.00	21.75	18.75	10.25			
	max	63.00	62.75	58.75	53.00	60.75	62.75	63.00	61.00	59.00	61.50	60.00	59.00			
	kurt. z	-N	-N	-N	-N	-N	-N	-N	-N	-N	-N	-N	-N			
Tolerance (Model 3)	skew. z	N	N	N	+ N	N	-N	-N	N	N	N	+ N	N			
	\bar{X}	37.18	35.44	29.65	29.32	33.10	31.69	43.59	37.34	32.42	33.95	32.30	28.42			
	SD	10.03	10.77	7.87	8.82	8.51	10.27	11.66	11.26	9.06	9.50	10.25	8.82			
	min	22.50	14.25	11.25	17.00	16.25	10.25	9.25	17.00	14.00	9.25	10.25	9.25			
	max	63.00	60.00	47.00	55.50	63.00	63.00	63.00	62.00	54.00	59.00	60.00	60.50			
Weighted (Model 4)	kurt. z	-N	-N	-N	N	3.72	N	N	-N	-N	-N	-N	N			
	skew. z	N	N	N	5.13	3.82	N	-N	N	N	N	N	N			
	\bar{X}	1407	1442	1518	1509	1545	1549	1250	3751	1504	1510	1587	1438			
	SD	509	524	502	385	445	549	574	469	419	476	520	416			
	min	338	559	839	648	483	468	383	610	554	371	433	457			
	max	2961	3508	3569	2493	2680	3443	3766	3038	2512	3169	2974	2903			
	kurt. z	-N	6.49	7.01	-N	N	N	13.80	N	-N	N	-N	3.67			
	skew. z	N	5.91	6.29	N	N	3.27	8.49	3.03	N	N	N	3.19			

(continued)

NOTE: A -N refers to a negatively valenced z for kurtosis, while an N refers to a $z < 3.00$ and > 0.00 .

The finding that level of uncertainty was typically greater than tolerance for uncertainty can also be seen in the results for motivation to reduce uncertainty in Model 5a (discrepancy model). Without fail, the mean for this difference variable was greater than zero, although, for the most part, motivation to reduce uncertainty defined as a difference equation was normally distributed. While the difference equation definition of motivation to reduce uncertainty evidenced distributions with large standard deviations and good ranges, the theoretic extremes of the variable were often not evidenced in the data. It also seems to be the case that actual minimum values were further from the theoretic minimum than were actual maximum values, indicating again the bias toward being motivated to reduce uncertainty in initial interactions. As expected, when motivation to reduce uncertainty was the positive difference between uncertainty level and tolerance for uncertainty (Model 5b) or the weighted function of uncertainty level (Model 4), the distributions tended to be skewed and "peaked" rather than flat. Nonetheless, both of these variables evidenced large standard deviations and good range.

These results on distributions suggest that our statistical tests will not be limited to a special case or a restricted range of values when uncertainty, tolerance for uncertainty, or motivation to reduce uncertainty (as defined by the weighting and discrepancy models) are employed. Taken in conjunction with the range of values obtained for the antecedents of tolerance for uncertainty, we conclude that the scenarios provide a good means of testing the hypotheses, axioms, and models of interest. Even in the case of the scholarship scenario in Study 3, the restriction in range only affected those tests where the antecedent of incentive value was involved, leaving tests of the baseline, replacement, weighting, and discrepancy models unaffected. Consequently, the seven hypotheses derived from Berger's (1979) analysis of antecedents to tolerance for uncertainty and the various models for integrating this tolerance into the framework of uncertainty reduction theory can proceed with some assurance of a fair range of perceptions being represented.

Tests of the Seven Hypotheses About Antecedents to Tolerance for Uncertainty

The seven hypotheses tested here were derived from the theoretical observations made by Berger (1979) concerning conditions when

persons might be less tolerant of their uncertainty and, consequently, more propelled to reduce it. As outlined previously, the central thesis of Berger's analysis was that as the level of each antecedent increases, tolerance for uncertainty decreases, which, in turn, increases one's level of monitoring. The first hypothesis based on this thesis was that each antecedent should be negatively correlated with tolerance for uncertainty. As can be seen in the first row of Table 10, in Study 1, anticipation of future interaction was negatively correlated with tolerance for uncertainty in three of the four scenarios, yielding an average effect size across the four scenarios of $r = -.33$, $p < .001$. By contrast, deviance was only once weakly correlated with tolerance for uncertainty in the restaurant scenario in Study 2, leading to an average effect size of $r = .06$, n.s. Incentive value was negatively correlated with tolerance for uncertainty in only two of the four scenarios, with an average effect size that, while negative, was not significant ($r = -.16$, n.s.). Consequently, it must be concluded that only anticipation of future interaction is a consistent antecedent of tolerance for uncertainty, leading to the rejection of Hypothesis 1 in the cases of deviance and incentive value.

The second hypothesis stemming from Berger's (1979) analysis of antecedents to tolerance for uncertainty predicted that tolerance for uncertainty should be negatively correlated with monitoring. Examination of the second row of Table 10 reveals that, without fail across the 12 scenarios, tolerance of uncertainty was negatively associated with monitoring, lending consistent and strong support to Hypothesis 2 (average effect size = $-.33$, $p < .001$).

Hypothesis 3 predicted that each antecedent should be positively correlated with monitoring. As can be determined from the third row in Table 10, in only five instances (the party and institute scenarios of Study 1 and all but the laundromat scenario in Study 3) did the antecedent correlate positively with monitoring. Deviance was unrelated to monitoring (average effect size = $.02$, n.s.), anticipation of future interaction had an inconsistent relationship with monitoring (average effect size = $.13$, n.s.), while incentive value seemed to be positively correlated with monitoring (average effect size = $.26$, $p < .001$). Consequently, Hypothesis 3 was rejected for the antecedents of anticipation of future interaction and deviance and supported for the antecedent of incentive value.

The fourth hypothesis stemming from Berger's (1979) analysis requires that the expected positive correlation between the antecedent

TABLE 10
Testing Antecedent to Tolerance to Monitoring Thesis

Correlation	Future Interaction				Deviance				Incentive Value			
	Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	Schol.
Antecedent with tolerance	-.09	-.54***	-.29**	-.37***	-.05	.07	-.01	.22*	-.19*	-.16	-.02	-.39***
Tolerance with monitoring	-.21*	-.23*	-.30**	-.34***	-.47***	-.34***	-.37***	-.38***	-.27**	-.28**	-.38***	-.41***
Antecedent with monitoring	-.08	.33***	.29**	-.05	-.04	.00	.07	.05	.37***	.19*	.16	.31***
Antecedent with monitoring partialing tolerance	(-.11)	.25*	.23*	(-.20*)	(-.07)	(.03)	(.07)	(.14)	.31***	(.16)	(.16)	.17
Monitoring with information seeking	.61***	.44***	.57***	.38***	.43***	.74***	.46***	.51***	.47***	.27**	.43***	.49***
Tolerance with information seeking	-.21*	-.19*	-.29**	-.27***	-.32***	-.43***	-.39***	-.53**	-.16	-.23*	-.24**	-.36***
Information seeking with information seeking	-.03	.16	.39***	.20*	.04	-.02	-.09	-.23*	.32***	.41***	.53***	.38***
Antecedent with information seeking partialing tolerance	(-.05)	(.06)	.34***	.11	(.03)	(.00)	(-.10)	-.14	(.30**) (39***)	(.39***)	(.54***)	.28**
Antecedent with uncertainty	-.17	-.11	-.18*	-.13	.24*	.31**	.00	.18*	-.30**	-.14	-.23*	-.23**

* $p < .05$; ** $p < .01$; *** $p < .001$.

and monitoring be attenuated when tolerance is held constant (i.e., partialled out). The test of whether tolerance for uncertainty moderates the effects of the relationship between the antecedent and monitoring is necessarily contingent on the results of previous tests. Such a test only makes sense to conduct when all three previous links (correlations in Hypotheses 1, 2, and 3) are significant (as it makes no sense to partial a relationship that does not or cannot exist). Inspection of the fourth row of Table 10 reveals that only four scenarios met this criterion (the party and institute scenarios in Study 1 and the bar and scholarship scenarios in Study 3). The most significant outcome of these tests is that the partial correlation between anticipation of future interaction and monitoring did not drop to zero when tolerance was held constant, although some moderation in the zero-order correlations was found (from .33 to .25 and from .29 to .23). Such a result implies that anticipation of future interaction might have both a direct and an indirect effect (via tolerance) on monitoring. The results for the two scenarios on incentive value are less consistent; in one case, the partial correlation dropped significantly (from .31 to .17) and was not significantly different from zero, while in the other case, no significant drop in the correlation was observed (from .37 to .31). A conservative and tentative conclusion based on these results might be that anticipation of future interaction evidences both a direct and an indirect effect on monitoring while incentive value and deviance are direct determinants of monitoring level.

The fifth and sixth hypotheses derived from Berger's (1979) analysis hinge on the relationship between monitoring and information seeking. It was argued that because monitoring is simply a type of information seeking strategy, not only should monitoring and information seeking be positively correlated (Hypothesis 5) but the results just reported for the first four hypotheses for monitoring should be mirrored when replicated for information seeking. As can be determined from rows 5 through 8 in Table 10, this is precisely the case. Monitoring and information seeking are consistently positively related (thus supporting Hypothesis 5, average effect size = .48, $p < .001$) and the relationships between the antecedent, tolerance for uncertainty, and information seeking mirror those for monitoring. However, as the results for monitoring led to the rejection of a number of hypotheses, Hypothesis 6 was rejected in part.

Hypothesis 7 focused on an implication of Berger's (1979) perspective, that being that each antecedent would affect one's tolerance for

uncertainty without affecting one's uncertainty level. It should be recognized that a built-in bias exists toward confirming this hypothesis of "no relationship" in this research because uncertainty level was manipulated intentionally in each stimulus scenario. Consequently, any finding of a correlation should be assumed to underestimate the true relationship if all variables were allowed to vary freely. As can be seen in the last row of Table 10, anticipation of future interaction was unrelated to uncertainty (average effect size = $-.15$, *n.s.*); combining this finding with other results, it is the case that anticipation of future interaction affected tolerance for uncertainty and not one's level of uncertainty and was highly related to both one's monitoring and information seeking levels. By contrast, incentive value was consistently negatively correlated with uncertainty (average effect size = $-.22$, $p < .01$) while being essentially unrelated to tolerance for uncertainty. Apparently, the more another person can satisfy one's needs, the more we believe that we are able to predict and explain that target person's behavior (a possibly interesting case of wishful thinking given that all participants in a given condition had access to the same amount of information about the target other). Finally, three of the four deviance scenarios yielded a positive relationship with uncertainty (average effect size = $.18$, $p < .05$). Apparently, norm violations lead persons to assess their knowledge of others as being lower than if the norm violations had not occurred. In sum, Hypothesis 7 is supported for anticipation of future interaction and rejected for incentive value and deviance.

What can be concluded about the thesis offered by Berger (1979) in terms of tolerance for uncertainty? First, the thesis is most reasonable for the antecedent of anticipation of future interaction where general support for the thesis is available. However, anticipation of future interaction seems to have both direct and indirect effects on monitoring/information seeking. Second, deviance is neither a determinant of tolerance for uncertainty nor of information seeking; rather, it is positively correlated with uncertainty. Third, incentive value also fails to be a determinant of tolerance for uncertainty although it is a determinant of information seeking as well as level of uncertainty. While it is clearly the case that tolerance for uncertainty determines monitoring and information seeking, the postulated determinants of tolerance for uncertainty must be rejected in terms of deviance and incentive value but not in terms of anticipation of future interaction. In other words, while tolerance for uncertainty varies across the range

of possible values for each scenario, the antecedents of incentive values and deviance have little to do with this variation.

While Berger's thesis needs rejection in terms of predicting when persons will be most concerned with uncertainty reduction, the concept that tolerance for uncertainty plays a role in uncertainty reduction theory need not be rejected on those same grounds. Indeed, only tests of the baseline model versus the scope, replacement, weighting, and discrepancy models will determine if tolerance for uncertainty might play a role in uncertainty reduction theory. Tests of these models were pursued by first focusing on accounting for information seeking in initial encounters and then focusing on liking for cointeractants.

Predicting Information Seeking

One critical aspect of uncertainty reduction theory concerns the relationship postulated in Axiom 3 between uncertainty and information seeking. Model 1 (the baseline model) predicts that level of uncertainty causes information seeking. As can be determined from the first row of Table 11, this model must be rejected, as uncertainty and information seeking were consistently *unrelated* (average effect size = $-.05$, n.s.) and when a relationship occurred (in the party scenario of Study 1 and the restaurant scenario of Study 2), it was opposite in direction to that predicted by the model. Consequently, Axiom 3 as formulated in the initial presentation of uncertainty reduction theory (Berger & Calabrese, 1975) receives no support on the basis of these results. Sunnafrank's (1986) reformulation of uncertainty reduction theory also fails to be supported due to the basic lack of relationship between uncertainty and information seeking. Sunnafrank predicted an inverse relationship between uncertainty and information seeking when outcomes are expected to be positive. The clearest test of Sunnafrank's reasoning can be found in the four scenarios related to the antecedent of incentive value in Study 3 as these scenarios all involve interactions where positive outcomes are expected. As before, no relationship between uncertainty and information seeking was uncovered (average effect size = $-.04$, n.s.). Consequently, neither Sunnafrank's (1986) prediction nor Berger and Calabrese's (1975) prediction can be supported. Rather, the conclusion must be that level of uncertainty and information seeking are not associated.

TABLE 11
Testing Models for Ability to Predict Information Seeking

Correlation	Future Interaction				Deviance				Incentive Value			
	Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	Schol.
Uncertainty (1) with information seeking	.03 (85)	-.26** (96)	-.01 (97)	.06 (101)	.07 (85)	-.08 (90)	-.01 (94)	-.27** (93)	.07 (100)	-.03 (102)	-.06 (100)	-.12 (104)
Scope model (2) Uncertainty with information seeking												
Tolerance = 1/2 (n)	.25 (41)	-.21 (49)	.04 (74)	.20* (79)	.21 (60)	.07 (65)	.01 (22)	.11 (45)	.14 (63)	-.06 (59)	.10 (67)	-.07 (82)
Tolerance = 1/3 (n)	.07 (19)	-.04 (24)	.12 (41)	.36** (59)	.02 (25)	.28* (36)	-.09 (8)	-.22 (21)	-.02 (36)	.12 (31)	-.10 (42)	-.01 (55)
Tolerance = 1/4 (n)	-.95 (3)	.01 (15)	.22 (19)	.40* (19)	-.17 (7)	.12 (15)	.14 (4)	-.23 (10)	.27 (17)	-.18 (13)	-.41* (18)	.05 (29)
Antecedent = 1/2 (n)	-.23 (15)	-.27 (34)	.00 (21)	.14 (52)	.09 (28)	-.11 (33)	.13 (48)	-.39*** (60)	.13 (49)	-.10 (90)	.22* (66)	-.13 (100)
Antecedent = 1/3 (n)	-.31 (6)	-.58** (15)	-.08 (12)	.21 (27)	.15 (11)	-.30 (19)	-.30 (31)	-.35** (46)	.21 (20)	-.08 (76)	.29* (43)	-.14 (92)
Antecedent = 1/4 (n)	— (0)	-.72 (5)	— (1)	.62 (8)	— (2)	-.55 (8)	-.92*** (8)	-.40* (22)	.28 (8)	.01 (46)	.35 (20)	-.19 (60)

(continued)

TABLE 11 Continued

Correlation	Future Interaction				Deviance				Incentive Value			
	Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	School
Tolerance (3) with information seeking	-.21*	-.19*	-.29**	-.27**	-.32***	-.43***	-.39***	-.53***	-.16	-.23*	-.24**	-.36***
Weighted (4) with information seeking	.21*	-.01	.18*	.30***	.34***	.31**	.41***	.41***	.16	.17*	.17*	.16
Difference (5a) with information seeking	.19*	-.06	.19*	.30***	.32***	.29**	.38***	.32***	.18*	.15	.16	.22*
Difference (5b) with information seeking	.23*	-.04	.22*	.27**	.28**	.29**	.41***	.33***	.16*	.18*	.21*	.16

NOTE: The model number (1 through 5) is indicated in parentheses following the specification of the correlation. The sample size is provided in parentheses below each correlation. Models 3 through 5 use the sample size of Model 1.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Model 2 (the scope model) suggests that when persons become intolerant of their uncertainty, then the level of uncertainty will be positively related to information seeking. Unfortunately, it is unclear when this magic moment of intolerance will arrive such that a positive relationship between uncertainty level and information seeking can be expected to occur. In other words, how intolerant of uncertainty do people have to be in order to say that the scope condition of the theory has been met? Three different intolerance thresholds were defined, each being an absolute point on the tolerance for uncertainty scale. Each threshold was defined to be more stringent than the one prior to it, thus requiring persons to report that they were less and less tolerant of their uncertainty in order for their data to be used in tests of the uncertainty/information seeking axiom. The first threshold defined the scope condition as being met by persons who reported their tolerance for uncertainty below the midpoint of the scale. The second threshold defined the scope condition as being met by persons reporting their tolerance for uncertainty in the lower one third of the scale values. The final threshold defined the scope condition as being met by persons reporting their tolerance for uncertainty in the lower one quarter of the scale values. These thresholds were defined by absolute points on the tolerance for uncertainty scale to assure that tests of the information seeking axiom were conducted only on data from persons who truly were intolerant of their uncertainty regardless of where they fell in the overall distribution of responses for that scenario.

While selecting out the data of those persons who are increasingly intolerant of uncertainty offers a means of providing a reasonable test of the scope model, it must be recognized that the sample sizes on which these tests were conducted necessarily grew smaller as the threshold became more stringent. No guarantee exists that an adequate number of people reported their tolerance for uncertainty as being in the lower one half, one third, or one quarter of the scale values. The second main row of Table 11 reports the tests of the scope model as well as the sample size on which the tests were based for the uncertainty/information seeking relationship. Perhaps the most striking finding is the consistent *lack* of relationship between uncertainty and information seeking regardless of the tolerance threshold used. The average effect size was small, nonsignificant, and unvarying regardless of whether the tolerance threshold referred to persons who reported scores in the lower one half ($r = .07$, n.s.), one third ($r =$

.08, n.s.), or one quarter ($r = .03$, n.s.) of the scale values. As with the baseline model, the two exceptions to the general lack of relationship between uncertainty and information seeking were found in the party scenario in Study 1 and the restaurant scenario of Study 2; in both cases, the association uncovered was in the opposite direction of that predicted by uncertainty reduction theory. These results reject the scope model in terms of its ability to account for information seeking in initial interactions.

These tests of the scope model relied on the boundary condition being met to the extent that persons reported particular scores on the tolerance for uncertainty scale. However, the reasoning underlying this model stemmed from Berger's (1979) analysis of antecedents of concern for uncertainty reduction. As such, it was noted that when each of the antecedents was at an elevated level—when persons expect future interaction with others, when others act deviantly, or when others have incentive value—then uncertainty and information seeking should be positively associated. Some doubt must be cast on this analysis because deviance and incentive value did *not* affect tolerance for uncertainty. Nonetheless, the scope model was tested wherein the boundary condition was defined to be met if persons reported their anticipation (Study 1), the target's deviance (Study 2), or the target's incentive value (Study 3) in the upper one half, upper one third, or upper one quarter of possible values on the respective scales. Table 11 reports the results of these analyses in the third main row. Simply stated, uncertainty and information seeking remained unrelated even when persons anticipated future interaction, saw a target other as deviant, or perceived a partner as having incentive value (upper one half average effect size = $-.04$, n.s.; upper one third average effect size = $-.09$, n.s.; and upper one quarter effect size = $-.11$, n.s.). The scope model simply cannot account for information seeking in initial encounters with others.

Model 3 (the replacement model) suggests that tolerance for uncertainty (rather than level of uncertainty) is negatively associated with information seeking when meeting others for the first time. As was reported previously and can be seen in Table 11, tolerance for uncertainty had a consistent negative relationship with information seeking (average effect size = $-.30$, $p < .001$). These results suggest that it is not whether people *can* predict and explain others' behavior but whether they *want* to do so that determines the extent to which they will seek information about others. In other words, it seems that the more

persons want to understand others, the more they seek information about them regardless of how much they already know (at least in initial encounters).

Unfortunately, the replacement model does not provide the sole possible account of information seeking in initial interactions. Both the weighting and discrepancy models also seem to offer a means of integrating tolerance for uncertainty into uncertainty reduction theory, at least in terms of accounting for information seeking behavior. Model 4 (the weighting model) suggests that motivation to reduce uncertainty occurs by weighting a persons' level of uncertainty by their lack of tolerance of that uncertainty; the resultant motivation is positively related to information seeking. Models 5a and 5b (the discrepancy model) suggest that motivation to reduce uncertainty is a function of the difference between one's uncertainty level and one's tolerance for that uncertainty; like the weighting approach, this model suggests that motivation is positively related to information seeking. As can be seen in Table 11, both the weighting (average effect size = .23, $p < .001$) and discrepancy (average effect size = .22, $p < .001$) models produced consistent positive correlations between motivation to reduce uncertainty and information seeking.

At first glance, these results would seem to argue for some form of integration of motivation to reduce uncertainty into the axiomatic framework of the theory. However, it is necessary to ask which model of motivation to reduce uncertainty (replacement, weighting, or discrepancy) is consistently *sufficient* to predict information seeking and does the best job of doing so. The replacement model provided the most consistent account of information seeking across the 12 scenarios as well as the largest average effect size (–.30 versus –.05 for baseline, .23 for weighting, .22 for discrepancy [5a], and .22 for discrepancy [5b]). In other words, the replacement model seemed to be the simplest and most parsimonious model for predicting information seeking in encounters between strangers; tolerance for uncertainty received the most support as a determinant of information seeking. Based on these results, then, tolerance for uncertainty can be integrated into the axiomatic framework of uncertainty reduction theory by replacing uncertainty as a determinant of information seeking. It should be recalled from previous analyses, however, that incentive value as well as tolerance for uncertainty serve as independent and important determinants of information seeking.

Predicting Liking

Prior to opting for one particular means of integrating tolerance for uncertainty into the framework of uncertainty reduction theory, it was necessary to test the ability of the various models to account for other postulated relationships. Axiom 7 in the initial formulation of the theory suggests that increases in uncertainty are accompanied by decreases in liking. The baseline model was derived as a representation of the initial formulation of the theory and hence predicts a negative association between uncertainty level and liking. As can be seen from the first row in Table 12, uncertainty had a consistent negative relationship with attraction (average effect size = $-.23$, $p < .001$). Only in two scenarios (interview scenario in Study 1 and church scenario in Study 2) did this relationship not emerge. These findings are quite consistent with previous research, suggesting that persons' level of uncertainty by itself, regardless of how concerned persons are about reducing it, can account for the attraction that persons feel for those they have just met. Any integration of tolerance for uncertainty into the framework of uncertainty reduction theory would consequently have to improve on this predictive ability, as the initial formulation of the theory has resulted in consistent support for Axiom 7.

The scope model makes a prediction similar to that of the baseline model; that is, uncertainty and liking should be negatively correlated. However, the scope model restricts this prediction to instances when people are concerned about reducing their uncertainty. As can be seen from the second main row in Table 12, when persons reported their uncertainty to be in the lower one half (average effect size = $-.24$, $p < .01$), one third (average effect size = $-.25$, $p < .01$), or one quarter (average effect size = $-.33$, n.s.) of possible scores on the tolerance for uncertainty scale, the estimate of the effect size is fairly constant, although it loses significance due to a drop in sample size. These results are virtually identical to those obtained when the boundary condition is said to be met due to elevated expectations of future interaction, deviance by the cointeractant, or the target other having high incentive value (for upper one half, average effect size = $-.24$, $p < .001$; for upper one third, average effect size = $-.30$, $p < .001$; and for upper one quarter, average effect size = $-.26$, $p < .01$; see third main row in Table 12). The results suggest that there is little reason to restrict

TABLE 12
Testing Models for Ability to Predict Liking

Correlation	Future Interaction			Deviance			Incentive Value					
	Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	Schol.
Uncertainty (1) with liking	-.22*	-.20*	-.22*	-.15	-.34***	-.51***	.05	-.18*	-.17*	-.28**	-.19*	-.33***
Scope model (2) Uncertainty with liking												
Tolerance = 1/2	-.09	-.26*	-.18	-.10	-.29*	-.48***	-.18	.02	-.16	-.28*	-.24	-.49***
Tolerance = 1/3	.11	-.13	-.30*	-.10	-.02	-.47**	-.20	-.26	-.18	-.19	-.29*	-.58***
Tolerance = 1/4	.58	-.14	-.19	-.18	.65	-.79***	.24	-.19	-.47*	-.36	-.51*	-.63***
Antecedent = 1/2	-.16	-.27	-.60**	-.04	-.26	-.39**	.07	-.14	-.18	-.33***	-.32**	-.34***
Antecedent = 1/3	-.04	-.44*	-.72**	-.13	-.78**	-.53**	.01	-.10	-.15	-.39***	-.37**	-.30**
Antecedent = 1/4	—	-.44	—	-.24	—	-.73*	-.40	.08	.07	-.32**	-.32	-.28*
Tolerance (3) with liking	-.03	.01	-.36**	-.27**	-.29**	-.32***	-.05	-.12	-.08	-.16	.15	-.06
Weighted (4) with liking	-.10	-.16	-.03	.06	.00	-.12	.08	.02	-.07	-.07	-.23*	-.28**
Difference (5a) with liking	-.17	-.19*	.01	.10	-.04	-.15	.08	-.03	-.07	-.09	-.25**	-.22*
Difference (5b) with liking	-.09	-.16	.01	.03	-.07	-.15	.09	-.04	-.11	-.06	-.23*	-.27**
Antecedent with liking	.01	-.10	.23*	.41***	-.41***	-.66***	-.42***	-.64***	.46***	.29**	.53***	.35***
Antecedent with liking partialling uncertainty	(-.03)	(-.12)	(.20)	(.40***)	-.36**	-.61***	(-.42***)	-.62***	.43***	(.27**)	.51***	.29**

NOTE: The model number (1 through 5) is indicated in parentheses following the specification of the correlation. The sample size is provided in Table 11 for each correlation. Models 3 through 5 use the sample size of Model 1.

* $p < .05$; ** $p < .01$; *** $p < .001$.

the prediction of a negative relationship between uncertainty and liking to only those instances when people are unable to tolerate their uncertainty, when they expect to interact again in the future with the target, when the target is behaving deviantly, or when the target has incentive value. The baseline model is equally good at predicting attraction as are these more restricted scope models and the baseline model has the advantage of doing so for a wider domain of interactions. Consequently, the scope model should be rejected in favor of the baseline model in terms of accounting for the extent to which persons will be attracted to each other during initial interactions.

As can be determined from rather quick perusal of the remainder of Table 12, none of the other models (replacement, weighting, or discrepancy) provided this consistency in the prediction of liking of the target person. For the replacement model, tolerance for uncertainty was not associated with liking (average effect size = $-.13$, n.s.) despite some significant relationships in particular scenarios. In two scenarios in Study 1 (institute and interview) and two scenarios in Study 2 (amusement park and devil worship), it appears that the less people want to know about others, the less they like them. However, across the 12 scenarios, tolerance for uncertainty had no relationship with attraction. Similarly, the weighting model (average effect size = $-.08$, n.s.) and both of the discrepancy models (average effect size = $-.09$, n.s.) also failed to be associated with attraction to any significant degree. These results would seem to suggest that the best model with which to predict attraction is Model 1 (the baseline model). In other words, concern for uncertainty reduction need *not* be integrated into the axiomatic framework of uncertainty reduction theory in order to better account for the attraction that we have for those we are meeting for the first time.

The existence of significant correlations between two of the antecedents (deviance and incentive value) and level of uncertainty suggests it might be useful to explore whether uncertainty or the antecedents or both serve as determinants of attraction prior to confirming the baseline model. An antecedent might be said to have a direct effect on attraction in one of two ways. One means of testing for a direct relationship is considering the case where an antecedent is unrelated to uncertainty but related to attraction. Previous analyses revealed that anticipation of future interaction was unrelated to uncertainty.

The issue here, then, is whether anticipation of future interaction is positively associated with attraction. Inspection of Table 12 reveals that for two of the scenarios in Study 1, expectations of future encounters were positively associated with liking, while for the other two scenarios in Study 1, no relationship existed between anticipation of future interaction and liking. It is difficult to decide if some unusual characteristic of the scenarios was generating these inconsistent results or if there was simply no relationship (average effect size = .15, *n.s.*) between anticipation of future interaction and attraction. Given that the average effect size is the single best estimate of the relationship that we can obtain from these data, we will cautiously conclude that anticipation of future interaction seems to be unrelated to attraction during initial encounters with others.

A second means of testing for a direct relationship is considering the case where an antecedent is related to uncertainty. Given that uncertainty was found to be related to liking, a means of testing for a direct relationship between an antecedent and liking would be to partial the effects of uncertainty from the antecedent/liking relationship and observe the extent of attenuation in the partialled correlation. If partialing level of uncertainty from the correlation between an antecedent and liking fails to drive that correlation to zero, then the antecedent might be said to have both a direct and an indirect effect (through uncertainty) on liking. As reported previously, deviance and incentive value were both found to be associated with uncertainty. The issues here are whether these two antecedents are associated with liking and, if they are, whether the correlation is attenuated when level of uncertainty is partialled out. As can be seen in Table 12, without fail these two antecedents were associated with liking; deviance was consistently and negatively correlated with liking (average effect size = $-.54$, $p < .001$), while incentive value was consistently and positively correlated with liking (average effect size = $.41$, $p < .001$). In all eight scenarios, partialing uncertainty from the relationship between the antecedent (deviance or incentive value) and liking failed to attenuate the correlation between them at all. The conclusion to be drawn from this analysis is that uncertainty and liking are correlated but that uncertainty does not moderate the effects of deviance or incentive value on liking. In other words, deviance, incentive value, and uncertainty level are all determinants of attraction.

Predicting the Relationship Between Information Seeking and Liking

Theorem 17 of uncertainty reduction theory specifies a negative relationship between information seeking and liking. Within the axiomatic framework of the theory, this negative relationship is a required deduction stemming from acceptance of Axioms 3 and 7. However, in the research reported here, level of uncertainty was found *not* to be associated with information seeking (in contradiction of Axiom 3), although it was found to be negatively associated with liking (as expected by Axiom 7). While the axiomatic framework of the theory would result in the prediction of a negative relationship between information seeking and liking, any such relationship detected in this research could *not* come about based on the reason that level of uncertainty was a common cause of both information seeking and liking. It is simply the case that in these data, uncertainty was not a cause of information seeking and thus cannot be the reason why information seeking would be associated with liking in the same data set.

In contrast to the negative relationship forwarded in Theorem 17 for information seeking and liking, Sunnafrank's (1986) reformulation of uncertainty reduction theory suggests a positive relationship between information seeking and liking when outcomes are expected to be positive. In Study 3, positive outcomes were anticipated. Such positive outcomes are even more likely to occur the more that persons perceive the target as likely to provide what is being sought. Basically, the incentive value of the target other was manipulated by the likelihood that the target would provide a valuable resource to the participant. Consequently, the scope condition model provided a particularly good test of the extent to which information seeking and liking are positively related when expected outcomes are positive. However, it should be noted that the reasoning for Sunnafrank's prediction is the same as the reasoning in uncertainty reduction theory: It is a required deduction due to the common cause of level of uncertainty. While in Sunnafrank's case, the analysis was restricted to instances when persons expect positive outcomes, the process of making the prediction relied on similar reasoning.

The first row of Table 13 lists the correlations between information seeking and liking for each of the 12 scenarios. It is fairly clear from a quick perusal of these correlations that information seeking and liking

TABLE 13
Testing Models for Ability to Predict Information Seeking and Liking

Correlation	Future Interaction				Deviance				Incentive Value			
	Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	Schol.
Information seeking with liking (1)	.10	.32***	.20*	.15	.09	.34***	.35***	.35***	.20*	.34***	.19*	.16
Scope model (2) information seeking with liking												
Tolerance = 1/2	-.23	.37**	.20*	.08	.04	.23*	.64***	.10	.09	.28*	.19	.19*
Tolerance = 1/3	-.18	.42	.11	-.02	.40*	.08	.83**	-.10	.12	.23	.35*	.12
Tolerance = 1/4	-.80	.33	.16	.11	.00	.18	.83	-.26	.01	.14	.23	.01
Antecedent = 1/2	.28	.44**	.26	.20	.19	.74***	.44***	.32**	.20	.34***	.09	.14
Antecedent = 1/3	-.22	.66**	.28	.24	.08	.83***	.43**	.25	.25	.35***	.00	.14
Antecedent = 1/4	—	.70	—	.44	—	.96***	.46	.06	-.06	.33**	.12	.17
Information seeking with liking (1) partialing uncertainty	.10	.29**	.20*	.17	.12	.34***	.41***	.36***	.28**	.32**	.25*	.11

(continued)

TABLE 13 Continued

Correlation	Future Interaction				Deviance				Incentive Value			
	Trip	Party	Institute	Interview	Park	Devil	Church	Restaurant	Bar	Ride	Laundromat	Schol.
Scope model (2)												
Information seeking												
with liking												
partialling uncertainty												
Tolerance = 1/2	-.22	.33*	.21*	.10	.11	.30*	.66***	.10	.12	.37*	.22	.18
Tolerance = 1/3	-.19	.42*	.15	.02	.40*	.25	.83**	-.17	.12	.26	.34	.15
Tolerance = 1/4	-1.00***	.33	.21	.20	.15	.45	.83	-.32	.16	.08	.02	.06
Antecedent = 1/2	.26	.40**	.33*	.21	.22	.76***	.45***	.29*	.23	.32***	.17	.10
Antecedent = 1/3	-.24	.55*	.33*	.28	.33	.83***	.45**	.23	.29	.35***	.12	.10
Antecedent = 1/4	—	.62	—	.78*	—	.99***	.25	.10	-.08	.35**	.26	.12

NOTE: The model number (1 through 5) is indicated in parenthesis following the specification of the correlation. The sample size is provided in Table 11 for each correlation. Models 3 through 5 use the sample size of Model 1.

* $p < .05$; ** $p < .01$; *** $p < .001$.

were *not* negatively associated with each other as required by Theorem 17 of uncertainty reduction theory. Never once was the correlation negative across the 12 scenarios and, in fact, the average effect size was positive ($r = .23, p < .001$). While Theorem 17 can be rejected, it is unclear whether Sunnafrank's (1986) alternative should be said to be supported. When only those persons who clearly believed that the target other would provide a resource were considered (see tests of the scope model in Table 13 for the four scenarios of incentive values), the effect in Study 3 seems to be mostly limited to the ride scenario. Even if a positive correlation between information seeking and liking can be said to exist based on the four scenarios in Study 3, the lack of a reason why this should occur makes it difficult to argue that Sunnafrank's reformulation should be supported. That is, as reported previously, level of uncertainty fails to be a common cause of information seeking and attraction even in the restricted domain of positive outcome values. Thus we conclude that information seeking and liking are positively associated, although neither uncertainty reduction theory nor its reformulation is capable of accounting for why that relationship occurs.

Summary

A visual picture representing the conclusions drawn from these three studies is shown in Figure 1. First, note that the three antecedents identified by Berger (1979) of tolerance for uncertainty cannot be equated as they have very different effects and operate in quite different manners. Second, the construct that comes closest to being a central determinant of both information seeking and liking is incentive value, lending some support to Sunnafrank's (1986) claim that predicted outcome values are more central than uncertainty reduction motivations in guiding interpersonal communication behavior. Third, no model herein tested that tried to integrate motivation to reduce uncertainty into the axiomatic structure of uncertainty reduction theory was found to be successful. Rather, tolerance for uncertainty, anticipation of future interaction, and incentive value were found to be determinants of information seeking, while level of uncertainty, incentive value, and deviance were found to be determinants of attraction.

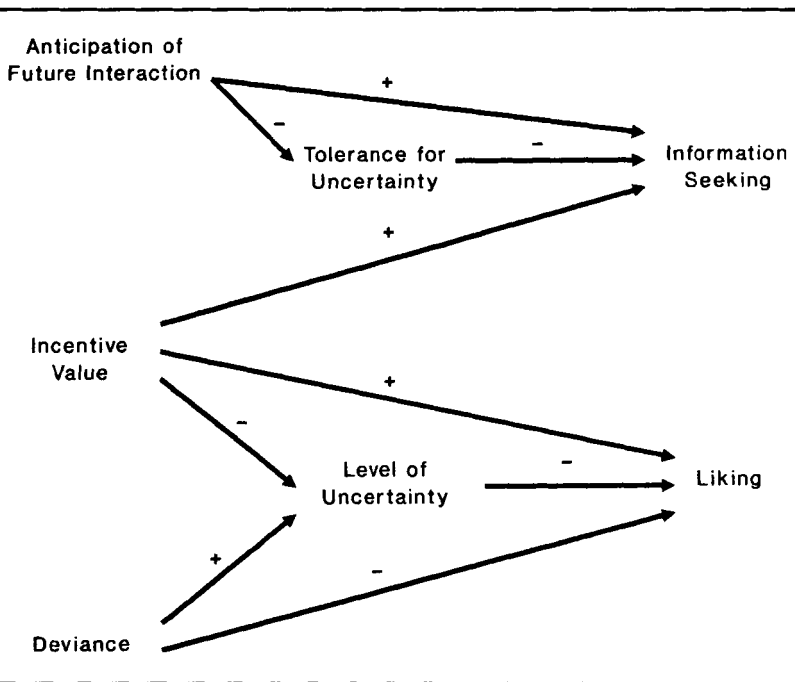


Figure 1

DISCUSSION

The initial goal of these three studies was to articulate and test models for integrating the concept of motivation to reduce uncertainty into the axiomatic structure of uncertainty reduction theory. Multiple models were considered, each model defining motivation to reduce uncertainty in a different way. Motivation to reduce uncertainty was defined as a scope condition (Model 2), as tolerance for uncertainty (Model 3), as a weighted function of uncertainty by its importance (Model 4), and as the difference between one's uncertainty level and one's tolerance for uncertainty (Models 5a and 5b). Each of these models was compared to the baseline model from the original presentation of the theory where level of uncertainty, by itself, serves as a determinant of various communication behaviors. Tests of these models in terms of their ability to predict information seeking and attraction revealed that none of the models provided a consistent integration of motivation to reduce uncertainty into uncertainty re-

duction theory. Rather, tolerance for uncertainty (Model 3) was one of three determinants of information seeking, while uncertainty (Model 1) was one of three determinants of attraction. Moreover, the baseline model was unable to predict information seeking, while the replacement model was unable to account for attraction for cointeractants. Consequently, it must be said that this integration attempt failed.

The reasons for this failure can be traced in large part to a failure to find support for two sets of theoretical claims, one set being the seven claims extracted from Berger's (1979) analysis of antecedents of tolerance for uncertainty and the other set related to Axiom 3 (the relationship between level of uncertainty and information seeking). The general thesis underlying the seven claims focusing on concern for uncertainty reduction is that as each antecedent increases, tolerance for uncertainty decreases, which leads, in turn, to increases in monitoring of the behavioral stream. Only for anticipation of future interaction was this causal chain supported, although even in this case, anticipation of future interaction had a direct as well as the expected indirect effect on monitoring. Deviance and incentive value failed to influence persons' tolerance for uncertainty; instead, they affected persons' uncertainty level. That is, deviant behavior by a target other and the ability of others to meet persons' needs do *not* specify conditions when persons are more concerned about uncertainty reduction. Based on these results, the general thesis articulated by Berger (1979) is incorrect as it applies to deviance and incentive value. Berger (personal communication, Spring 1988) noted the problem with deviance potentially failing to affect one's tolerance for uncertainty, although the results found here suggest that the problem is somewhat broader. Both deviance and incentive value failed to serve as antecedents of tolerance for uncertainty and both affected one's level of uncertainty. In other words, anticipation of future interaction, deviance, and incentive value are fundamentally different types of variables and should not be treated as "three antecedents of tolerance for uncertainty."

Finding deviance and incentive value to be antecedents of uncertainty level (rather than tolerance for uncertainty) suggests that the axiomatic framework of uncertainty reduction theory could be revised to reflect the role that these two variables play in the generation of uncertainty. As the theory currently stands, three causes of uncertainty level exist: perceived similarity, nonverbal affiliative expressiveness, and amount of verbal communication. The more that per-

sons perceive themselves to be similar to a target other, the more that positive nonverbal feedback is provided, and the longer people talk, the less uncertain they tend to be. It is now possible to suggest the addition of two other determinants of uncertainty to this list: deviance and incentive value. Axiom 8 might read: As the target's behavior becomes more deviant, level of uncertainty increases. Axiom 9 might read: The greater the incentive value of the target, the lower persons' level of uncertainty. This research not only provides support for these added axioms, but it provides support for the theorems that are deduced from these axioms and Axiom 7. If these two axioms were added to the theory, then one theorem that could be deduced would predict that deviance and liking were negatively associated while another theorem would predict that incentive value and liking were positively associated. Both of these predictions are supported by the findings in this research. Not accounted for by the addition of these two axioms to uncertainty reduction theory, however, are the direct effects that deviance and incentive value were found to have on attraction. Deviance and attraction are not only indirectly related to attraction (as the addition of the two axioms would suggest), but are also directly related to attraction independent of the linkage through persons' level of uncertainty. Consequently, while the addition of these axioms would expand the scope of uncertainty reduction theory, it is not clear that they fully represent the roles that deviance and incentive value play in the determination of attraction.

Adding these two axioms results in a number of other possible theorems beyond those relating these antecedents to attraction. If Axiom 8 were added, then the theory would predict that increases in deviance would be matched by decreases in intimacy, perceived similarity, and amount of verbal communication. Each of these predictions seems reasonable on its face: The more atypically someone behaves, then the less likely we want to disclose to them, the less similar we think we are to them, and the less we want to talk with them. The theorems stemming from the addition of Axiom 9 also seem intuitively reasonable. If Axiom 9 were added, then the theory would predict that increases in incentive value would be matched by increases in intimacy, perceived similarity, and amount of verbal communication. In other words, when we think that others can provide positive outcomes for us, then we are more likely to disclose to them, feel we are similar to them, and want to talk with them. More troublesome are the predictions made by the theory in terms of information

seeking if these two axioms were added. Addition of Axiom 8 would lead to a prediction that deviance and information seeking are positively associated while addition of Axiom 9 would lead to the prediction that incentive value and information seeking are negatively correlated. In the results reported in this research just the opposite was uncovered: Deviance was unassociated with information seeking with the bias being toward a negative association if one can be said to exist at all, while incentive value was positively associated with information seeking.

The problems with these predictions most likely stem from the need to revise Axiom 3 of uncertainty reduction theory. Axiom 3 predicts a positive association between uncertainty and information seeking; however, despite the intuitive appeal that this axiom has, level of uncertainty simply did not correlate with information seeking in this study as well as in other studies. The appeal of this axiom seems to be that the rational thing for persons to do when they do not know something is to find out about it. However, such a rationale assumes that persons *want* to acquire the information. As it turns out, one's tolerance for uncertainty is the critical determinant of information seeking behavior, not one's level of uncertainty. It is not how much a person knows about others but how much a person *wants* to know that causes information seeking to occur. These results seem surprising due to the very strong belief many people have in the validity of Axiom 3. However, this axiom was never really tested extensively nor supported strongly in the tests that were conducted. The strongest support for this axiom comes from studies that report simultaneous declines in question asking and uncertainty over the course of conversations. The declines in question asking are interpreted to be declines in information seeking. It may be the case that question asking is an important though insufficient measure of information seeking. For example, if the number of questions that a person asks decreases over time because the conversational partner provides increasingly long answers, information seeking has not necessarily decreased. Similarly, question asking may be replaced by other information seeking strategies as time progresses in a conversation. Disclosure has been found to be a means of seeking information about others as has relaxation (for review, see Berger & Kellermann, in press). Either or both of these strategies may supplement or supplant question asking over the course of a conversation. In this study (as in others that failed to support Axiom 3), information seeking included

the full range of passive, active, and interactive strategies delineated by Berger (1979). Based on the results of this study, it appears that Axiom 3 should be removed from uncertainty reduction theory.

While Axiom 3 might usefully be removed from uncertainty reduction theory, Axiom 7 should clearly be retained based on the results of this research. The negative association expected between level of uncertainty and attraction was consistently obtained across 12 tests of the axiom and to roughly the same degree as in past research ($-.20$ to $-.35$ correlations). Despite this axiom being viewed with suspicion and skepticism by many, a stable effect of uncertainty on liking occurs. One of the findings of this research helps to shed light on why this axiom continues to be disbelieved despite consistent support. In this research, both incentive value and uncertainty were isolated as causes of attraction; that is, being able to predict and explain others' behavior makes them more attractive just as does the receipt of positive outcomes. It seems important not to confound the *increased* attraction that occurs due to an increased ability to predict and explain others' behavior with the *decreased* attraction that occurs with the receipt of negative outcomes. Liking has potentially many causes, only one of which is discussed in uncertainty reduction theory. Uncertainty reduction theory is simply saying that knowledge helps in this attraction process; it does not rule out the role that the valence of expected outcomes also has. In other words, it is not the case that causes of liking must be mutually exclusive of each other nor operate in concordant ways. A person can be more or less uncertain *and* positive or negative about expected outcome values. The addition of Axiom 9 (on incentive values) offers a way of accounting for the effects on attraction of both level of uncertainty and expectation of the outcome value.

The removal of Axiom 3 also leads to the removal of Theorem 17 from uncertainty reduction theory, a theorem predicting a negative association between information seeking and liking. Not once did this negative association arise across 12 tests of the theorem and, in fact, the reverse was found: Information seeking and liking were positively associated. Uncertainty reduction theory is unable to explain this positive association between information seeking and liking, although a plausible reason for making the opposing prediction can be isolated and corrected. Theorem 17 is not an optional specification of uncertainty reduction theory but a necessary prediction stemming from the inclusion of Axioms 3 and 7. The theory identifies level of uncertainty as a common cause of both information seeking and

attraction; that is, decreases in uncertainty are associated with decreases in information seeking (Axiom 3) as well as increases in attraction (Axiom 7). If Theorem 17 is in error, then that error must exist in either or both of the axioms on which it is based. Given the general support for Axiom 7 (attraction) and the general rejection of Axiom 3 (information seeking) in this research, it is likely that the error in the prediction in Theorem 17 can be attributed to problems with Axiom 3. Consequently, the suggested removal of Axiom 3 from the theory eliminates this prediction as level of uncertainty is then no longer postulated to be a common cause of both information seeking and liking.

While uncertainty reduction theory neither predicts nor accounts for a positive association between information seeking and liking, Sunnafrank's (1986) reformulation of the theory made precisely this prediction when expected outcomes are positive. Here, when expected outcomes were positive, the prediction of the reformulated theory was supported, and normally this would encourage people to increase their faith in the reformulated theory. However, other data indicate that the reasoning underlying the prediction of a positive association by the reformulated theory *cannot* be supported. Sunnafrank, like Berger, based the reasoning for the association between information seeking and liking on the assumption that level of uncertainty is a common cause of both variables. However, tests indicated that even when expected outcomes were positive, level of uncertainty and information seeking were not associated. Consequently, the positive association detected between information seeking and liking cannot be accounted for within the framework of either uncertainty reduction theory or Sunnafrank's reformulation of that theory.

It is possible to locate, however, an explanation of the positive association between information seeking and liking by examining the results of Study 3, the study focusing on incentive value. Incentive value was found to be a determinant of liking (directly and indirectly), information seeking, and level of uncertainty; these interrelationships provide an explanation for the positive association between information seeking and liking. As can be seen in Figure 1, incentive value is a common determinant of both information seeking and liking, being positively associated with both. This representation requires that information seeking and liking be positively correlated with each other. A test of the value of this explanation is possible in that the positive association between information seeking and liking should

be attenuated when incentive value is partialled out of their relationship. Follow-up analyses revealed that not only did this attenuation occur but the partialled correlation generally approached zero.⁵ Both Berger (1979) and Sunnafrank (1986) assigned a role to incentive value, although the role that it actually plays in initial interactions is outlined by neither uncertainty reduction theory nor its reformulation. Incentive value is not an antecedent of tolerance for uncertainty nor is it a determiner of when information seeking and liking will be positively versus negatively associated. Rather, incentive value seems to be a common cause of information seeking and liking, hence producing their positive association.

Finding that incentive value determines both information seeking and liking does not imply that it is a more important motivator of initial interaction behavior than uncertainty. The results of the three studies reported here clearly point to the importance of *both* incentive value and uncertainty in understanding initial interaction behavior. Level of uncertainty was consistently found to be negatively associated with liking as predicted by Axiom 7. In addition, mean levels of uncertainty were found to exceed mean tolerance levels for that uncertainty; that is, persons typically were more uncertain than they cared to be as is presumed by the rationale for uncertainty reduction theory. Not only does the removal of Axiom 3 (information seeking) leave uncertainty reduction theory mostly intact, but the inclusion of Axiom 8 (deviance) and Axiom 9 (incentive value) adds significantly more explanatory and predictive power to the theory that is consistent with the findings from this and other research. This research demonstrated that incentive value is neither an antecedent of tolerance to uncertainty nor a condition that determines when information seeking and liking will be positively versus negatively associated. However, incentive value is an antecedent of level of uncertainty and inclusion of it in the axiomatic framework results in theorems that make intuitive as well as practical sense. With this integration comes the perspective that both incentive value and level of uncertainty play an important role in guiding behavior in first encounters with others.

It is clear that further work will be needed to test the general validity of the reasoning offered for the interpretations of the results reported for these three studies. This research restricted the analysis of the role that tolerance for uncertainty plays in uncertainty reduction theory to the outcomes of information seeking and attraction.

Other outcomes of uncertainty reduction (intimacy, reciprocity rate, and so on) should be examined not only to see if the results of this research can be replicated but to extend the generalizability of the analysis to other interaction behaviors. Tests of the theoretical predictions resulting from inclusion of axioms recognizing deviance and incentive value as causes of level of uncertainty are also required; these axioms were suggested for inclusion based on tests of theorems relating these variables to liking. Further work is needed to assure that these variables relate to intimacy, reciprocity rate, perceived similarity, and amount of nonverbal affiliative expressiveness as their inclusion in the theory would predict. Finally, it would be useful to replicate these results in variety of settings and using a number of different methodologies so that the nature of the study generating the results can be ruled out as a cause of those results.

Within the limitations of this research, however, the following conclusions can be offered. First, concern for uncertainty reduction is not a scope condition for uncertainty reduction theory. Anticipation of future interaction increases concern for uncertainty reduction and that concern affects information seeking, but these variables have no relationship to level of uncertainty that could be uncovered nor do they seem to interact with other aspects of uncertainty reduction theory. Second, uncertainty reduction theory might be benefited by removing Axiom 3 on information seeking from its structure and by adding two axioms recognizing deviance and incentive values as causes of level of uncertainty. Level of uncertainty failed to be a cause of information seeking regardless of whether positive outcomes were expected or not. However, level of uncertainty was consistently related to attraction and this relationship did not vary as a function of incentive value. Third, no need exists to integrate concern for uncertainty reduction into the axiomatic framework of uncertainty reduction theory in order to better account for attraction, at least based on the models tested in this research. None of these models was able to improve on level of uncertainty as a predictor of attraction. Fourth, such passive strategies as monitoring can be used in interactive as well as observational settings. Fifth, anticipation of future interaction, deviance, and incentive value should not be referred to as "antecedents to tolerance for uncertainty." Finally, wanting knowledge rather than lacking knowledge is what promotes information seeking in initial encounters with others.

NOTES

1. Berger (1979) introduced the purpose of his article by writing: "In the sections which follow, we will consider the conditions set in motion in the quest for higher knowledge levels and ultimately mutual understanding" (pp. 126-127). Such a statement seems consistent with the position that the conditions identified will affect one's concern for uncertainty reduction, presuming, of course, that "the quest for higher knowledge levels" can be equated with "one's concern for uncertainty reduction." This position is also consistent with later writings (e.g., Berger & Bradac, 1982), where the three conditions are explicitly stated to heighten one's "concern for uncertainty reduction." However, at other times, Berger (1979) argued that the antecedents serve to increase one's awareness and monitoring of the other's behavioral stream. For example, Berger wrote: "In the discussion that follows, we will consider several antecedents to increases in awareness and monitoring" (p. 127).

2. For example, Berger (1979) wrote: "When persons come to believe that others can satisfy certain needs, that is, the others have incentive value, we expect that efforts will be made to find out more about the person with high incentive value so that the perceiver can develop strategies for obtaining rewards from him" (p. 128).

3. Berger made the claim of differential reduction of uncertainty explicitly in the case of anticipation of future interaction when he wrote: "When persons expect to interact with each other in the future, they will monitor their present interaction more carefully and try to reduce their uncertainties about each other more" (Berger & Bradac, 1982, p. 15).

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5. In the bar scenario, the zero order correlation between information seeking and liking ($r = .20, p < .01$) dropped to zero when incentive value was partialled out ($r = .04$, n.s.); in the ride scenario, the correlation ($r = .34, p < .001$) was attenuated ($r = .23, p < .05$); in the laundromat scenario, the correlation ($r = .19, p < .05$) dropped to zero ($r = .03$, n.s.); and in the scholarship scenario, the correlation ($r = .16$, n.s.) was attenuated ($r = .07$, n.s.).

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