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## A COMPARISON OF ALTERNATIVE PROCEDURES FOR RESOLVING INDETERMINACIES IN THE THEORY OF REASONED ACTION

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STEPHEN G. SAPP AND HELEN H. JENSEN

Five suggested alternatives for resolving indeterminacies in the theory of reasoned action resulting from ill-formed intentions were examined for their ability to predict Japanese consumer intentions to eat U.S. beef. Assessment relied upon structural equation analysis of data collected from 594 respondents in a nationwide survey of Japanese beef consumers. The alternative that incorporated product characteristics associated with the diffusion of innovations model provided the best fit to the data and the best prediction of intentions. Implications are suggested for procedures for resolving attitude- and subjective norm-intention indeterminacies in the theory of reasoned action.

Studies indicate that under certain conditions the attitude and subjective norm components of the theory of reasoned action (Fishbein & Ajzen, 1975) provide poor prediction of intentions (e.g., Bagozzi, 1992; Liska, 1984). Instances where the model fails adequately to predict intentions—termed “indeterminacies” with respect to the attitude- and subjective norm-intention relationships—typically occur when behavior is not entirely volitional (Ajzen, 1985, 1991; Ajzen & Madden, 1986) or when intentions are “ill-formed,” that is, when they are indicative of people’s unfamiliarity with the target behavior (Bagozzi & Yi, 1989). We identified from the literature five suggestions for resolving indeterminacies related to ill-formed intentions and, using structural equation modeling, examined their validity for predicting intentions to eat U.S. beef among Japanese consumers.

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**INDETERMINACIES IN THE THEORY OF REASONED ACTION**

Fishbein and Ajzen (1975) state that indeterminacies can occur when “stimulus conditions” (e.g., social-demographic characteristics of the person, situational variations, behavioral variations) have strong effects on beliefs and/or perceived opinions of significant others. They suggest that such indeterminacies can be resolved by adding to the theory as antecedent conditions affecting beliefs and perceived opinions of significant others stimulus conditions with strong effects on these variables. They state that another explanation for observed indeterminacies is inadequate specification of beliefs and significant others. They suggest that the resolution for indeterminacies arising for this reason is to extend the list of beliefs and/or significant others being measured to capture fully the scope of people’s beliefs and perceived social support.

A third explanation offered for observed indeterminacies is that the actor perceives a lack of resources to engage in the target behavior. To account for indeterminacies related to a perceived lack of resources (economic or otherwise), Ajzen (1985, 1991) and Ajzen and Madden (1986) developed the theory of planned behavior, wherein perceived behavioral control is specified as directly affecting intentions and behavior.

A fourth explanation is that the attitude- and subjective norm-intention relationships are mediated by contingent conditions: variables other than attitudes and subjective norms that might have direct effects on intentions. Although this approach has proved useful across many studies, Bagozzi (1992) states that its drawback is the potentially unlimited number of “other variables” that can be added to the theory. Bagozzi (1992) relied upon Lazarus’ (1991) theory of motivation to suggest that self-regulating processes—cognitive appraisals, emotional reactions, and coping responses—acting as contingent conditions mediate the attitude-intention and subjective norm-intention relationships.

Thus, previous literature discusses what we have classified as five suggestions for resolving indeterminacies in the theory of reasoned action. We agreed with Bagozzi’s suggestion to resolve indeterminacies by incorporating into the theory of reasoned action contingent conditions derived from other social-cognitive theories. Rather than using the theory of motivation, however, we followed Paul’s (1990) suggestion that the theory of reasoned action might be integrated with the innovation-decision process (Rogers, 1995).

The innovation-decision process (Rogers, 1995) posits five product characteristics that affect innovation decisions: relative advantage, compatibility, complexity, trialability, and observability. Paul (1990) found that perceived innovation characteristics of contraceptives, such as worry about becoming pregnant (relative advantage), sexual morals (compatibility), and their availability (trialability), mediated the attitude-intention and subjective norm-intention relationships in the theory of reasoned action. Thus, the integration of the innova-

tion-decision process within the theory of reasoned action offers a theoretically sound approach to identifying contingent conditions that might resolve ill-formed intentions.

#### **THEORETICAL MODELS SUGGESTED BY APPROACHES TO RESOLVING INDETERMINACIES**

Approaches offered in previous research for resolving indeterminacies in the theory of reasoned action suggest six causal models for predicting Japanese consumer intentions to eat U.S. beef. Model 1 is the theory of reasoned action. Model 2 is the theory of reasoned action with antecedent stimulus conditions. Model 3 posits income and age as exogenous variables affecting intentions rather than as antecedent stimulus conditions. This approach has the advantage of adding key variables that might have direct effects on intentions, but it reflects the "other variables" approach rather than theoretical derivation. Model 4 is a specification of the theory of planned behavior. Ajzen (1985) defines perceived behavioral control as a consideration of resources and opportunities to engage in the target behavior. We envisioned three resource and opportunity conditions that might affect Japanese consumers' perceived behavioral control over eating U.S. beef: their perceptions of the expense of eating U.S. beef, their perceived suitability of U.S. beef for their meal preparation practices, and the availability of U.S. beef in nearby stores. In Model 5, we specified perceived expense and suitability as beliefs rather than as indicators of perceived behavioral control. This model reflects the approach suggested by Fishbein and Ajzen (1975) of accounting for product characteristics by adding them to the list of beliefs affecting attitudes. Model 6 incorporates relative advantage, complexity, trialability, and observability into the theory of reasoned action as contingent conditions.

### **METHODOLOGY**

#### **SAMPLE**

The data came from responses to a 1995 survey mailed to 2,200 households across seven regions in Japan (Sapporo, Sendai, Tokyo, Nagoya, Osaka (except Kobe city because of the 1995 earthquake), Hiroshima, Fukuoka). The questionnaire was drafted in English then reviewed by a professional translation company and two Japanese social scientists before being typeset into Japanese. The survey used the total design method (Dillman, 1978) with a monetary incentive (a 500¥ telephone dialing card) to gain a response rate of 53 percent of the 1,950 households contacted. Because we required valid evaluations of U.S. beef, we tested the theoretical models only for those persons who had previously eaten it. Thus, the 1,032 responses were screened for respondents who reported ever having eaten U.S. beef. This procedure resulted in a sample size of 594. The aver-

aged age of the sample respondents equaled 43.6 years, and their averaged household income before taxes was ¥8.12 million. Females constituted 94.4 percent of our sample.

#### MEASUREMENT

Intention was measured with the statement, "I intend to eat U.S. beef within the next four weeks." The distribution of responses to this measure was: 1 = 10.9%, 2 = 7.6%, 3 = 2.9%, 4 = 50.7%, 5 = 6.2%, 6 = 7.4%, 7 = 14.3%. Bagozzi and Yi (1989) argue that a high percentage of responses in the middle categories of an intention measure reflect strong ambiguity—or "ill-formed" intentions—about engaging in the target behavior. They state that ill-formed intentions cannot logically be treated as a continuous variable. We therefore coded intention as an ordinal variable with three categories: 1-2 = "low," 3-4-5 = "middle," and 6-7 = "high."

Attitude toward eating U.S. beef was measured as a composite construct based on the degree of agreement with three statements: "For me, U.S. beef is [satisfying, enjoyable, good] to eat." Principal components factor analysis indicated that the attitude construct was unidimensional. Its alpha reliability (Cronbach, 1951) equaled .84. Subjective norm was measured with the statement, "Most persons that I know eat U.S. beef." Beliefs were measured as a composite construct based on nine statements: "U.S. beef...[tastes good, has a good reputation for quality, is tender to eat, is nutritious to eat, is safe to eat, has little outside fat, is well marbled, has a fresh looking color, has good texture]." Each of these characteristics was weighted by its rating of importance to the respondent. Principal components factor analysis indicated that the beliefs construct was unidimensional. Its alpha reliability equaled .85. Opinions of significant others were measured with the statements, "[My family, store personnel, medical professionals] [like to eat/recommend] U.S. beef."

Each of these statements was weighted by the importance of the opinions of the significant other to the respondent.

The perceived expense of U.S. beef was measured with two statements, "U.S. beef is expensive to purchase" and "Different cuts of U.S. beef are sold at a reasonable price." The alpha reliability of the expense construct was .71. The suitability of U.S. beef for Japanese dishes was measured with the statement, "U.S. beef is suitable for Japanese dishes." The measures for expense and suitability were weighted by the importance of [inexpensive beef/reasonable prices for cut of beef/beef suitable for Japanese dishes] to the respondent when they were treated as beliefs in Model 5. Product characteristics were measured with contingency statements, "I would buy more U.S. beef if...[the price were lower (relative advantage), I knew more recipes (complexity), the packages were smaller (trialability), I saw it advertised (observability)]."

**PROCEDURE**

Structural equation modeling using the LISREL 8 statistical package (Jöreskog & Sörbom, 1993) was used to evaluate the six causal models. As recommended by Jöreskog and Sörbom (1993), we calculated a polyserial correlation matrix for the combination of ordinal and continuous variables and estimated the six causal models using the generalized least squares procedure. For each model, the additional variables associated with it were added to the theory of reasoned action and this specification was estimated as a null model. Then the appropriate paths for the hypothesized (alternative) model were estimated. A difference in chi-square goodness-of-fit test (Bollen, 1989) was used to evaluate the effectiveness of each alternative model compared with its null version. Because the six causal models used different variables and different causal structures, it was statistically inappropriate to compare them with one another using difference in chi-square tests (i.e., they were not nested models). So, we examined also the coefficients of determination for the structural equation predicting intention and the Critical N (CN) goodness-of-fit indicators (Hoelter, 1983) to compare the six models.

**RESULTS**

Model 1 (the theory of reasoned action) yielded a chi-square value of 117.32 at 13 degrees of freedom, a CN of 141 ((Hoelter, (1983) suggests a value of 200 or greater to imply good fit for a structural equation model), and a coefficient of determination for intention to eat U.S. beef of .01 (Table 1). The coefficients of determination for attitudes and subjective norms (Table 2) indicate that the theory of reasoned action provided good explanation of these variables, but provided very weak explanation of intentions. It is in such cases that the theory of reasoned action is said to be indeterminate with respect to predicting intentions.

The chi-square difference test of 13.77 at 8 degrees of freedom derived from estimating the fit of Model 2 with its null version indicated that adding income and age as antecedent stimulus conditions to the theory of reasoned action did not significantly improve its ability to predict intentions. Furthermore, although the parameter estimates for the effects of income and age on beliefs were statistically significant (Table 2, column 2), these were the only two paths of the eight added to Model 1 that were significant and the prediction of attitudes and subjective norms was substantively reduced in Model 2 compared with Model 1.

The chi-square difference of 0.29 between the alternative and null forms of Model 3 indicated that adding direct paths from income and age to intentions did not significantly improve the fit of the theory of reasoned action. Also, neither of the parameter estimates for the effects of these variables on intentions was statistically significant (Table 2, column 3), nor did the coefficient of determination for intentions change from the value of .01 found for the baseline model. To

examine more closely the relationships of income and age with intention, we calculated mean scores for intention for quartiles of income and age. Averaged scores for intention equaled 4.16, 4.07, 4.55, and 3.87 for the income categories arranged from the lowest to the highest quartile. The difference between these averaged scores for the third highest and highest quartiles was statistically significant at  $p < .05$  (Scheffé, 1959). Because the highest averaged intention score occurred for the third highest rather than highest income quartile, and because only two of the six comparisons among quartiles were statistically significant, we concluded that Japanese consumers' intentions to eat U.S. beef were not significantly affected by their household income. Averaged scores for intention equaled 4.19, 4.00, 4.16, and 4.21 for the four age quartiles. Because none of the differences in these scores was statistically significant, we concluded that Japanese consumer intentions to eat U.S. beef were not significantly affected by their age.

The alternative form of Model 4 (the theory of planned behavior) provided significantly better fit than its null version (Table 1). Examination of the parameter estimates for the perceived expense of U.S. beef and its suitability for Japanese dishes (Table 2, column 4) showed that the estimate for perceived expense was significant. Thus, the improved fit seems to have occurred because of the significant direct effect of perceived expense on intentions to eat U.S. beef. But the coefficient of determination for intentions in Model 4 equaled only .03, which means this model provided little predictive ability for intentions.

TABLE 1  
NULL AND ALTERNATIVE MODELS FOR PREDICTION OF INTENTION TO EAT U.S. BEEF.

Model <sup>a</sup>	Chi-Square	d.f.	Chi-square Difference <sup>b</sup>	CN <sup>c</sup>	Coeff. Det. for Intent <sup>d</sup>
Model 1.	117.32	13	—	141	.01
Model 2: Null	273.98	31	—	114	.01
Model 2: Alternative	260.21	23	13.77	96	.01
Model 3: Null	158.27	29	—	187	.01
Model 3: Alternative	157.98	27	0.29	177	.01
Model 4: Null	180.66	21	—	129	.01
Model 4: Alternative	169.90	19	10.76**	127	.03
Model 5: Null	137.50	21	—	169	.01
Model 5: Alternative	129.88	19	7.62*	166	.01
Model 6: Null	491.15	45	—	85	.01
Model 6: Alternative	181.86	41	309.29**	213	.37

- The null model has restricted parameter estimates for the added paths to the theory of reasoned action. The alternative model estimates the additional paths as specified in the theoretical models.
- The difference in chi-square between the null and alternative model with degrees of freedom equal to d.f. (null model) minus d.f. (alternative model). The chi-square difference test is: \* significant at  $p < .05$ ; \*\* significant at  $p < .01$ .
- Hoelter's Critical N, where  $CN > 200$  is recommended as an indication of good fit.
- The coefficient of determination for expressed intention to eat U.S. beef.

TABLE 2  
STANDARDIZED PARAMETER ESTIMATES AND COEFFICIENTS OF DETERMINATION FOR THE SIX  
APPROACHES TO RESOLVING INDETERMINACY IN THE THEORY OF REASONED ACTION.<sup>a</sup>

Path	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Beliefs R Attitude	.75**	.49**	.76**	.78**	.69**	.76**
Family member R SN	.30**	-.15*	.30**	.31**	.30**	.30**
Store Personnel R SN	.05	-.02	.07	.06	.06.08	
Med. Pros. R SN	.12**	.03	.12**	.13**	.12**	.16**
Attitude R Intention	.10**	.06	.09*	.05	.10*	.03
SN R Intention	.04	.00	.03	.01	.02	-.02
Income R Beliefs	—	-.12**	—	—	—	—
Income R Family	—	-.07*	—	—	—	—
Income R Store Per.	—	-.02	—	—	—	—
Income R Med. Pros.	—	-.03	—	—	—	—
Age R Beliefs	—	.05	—	—	—	—
Age R Family	—	.05	—	—	—	—
Age R Store Per.	—	-.06	—	—	—	—
Age R Med. Pros.	—	.00	—	—	—	—
Income R Intent	—	—	-.02	—	—	—
Age R Intent	—	—	-.01	—	—	—
Expense R Intent	—	—	—	.14**	—	—
Suitability R Intent	—	—	—	-.01	—	—
Expense R Attitude	—	—	—	—	.05	—
Suitability R Attitude	—	—	—	—	.08*	—
Lower Prices R Intent	—	—	—	—	—	.39**
More Recipes R Intent	—	—	—	—	—	.22**
Sm. Packages R Intent	—	—	—	—	—	-.05
See Adv's. R Intent	—	—	—	—	—	.13**
<b>Coefficients of Determination</b>						
Attitude	.58	.20	.59	.64	.59.58	
Subjective Norm (SN)	.15	.02	.16	.17	.16.16	
Intention to Eat U.S. Beef	.01	.00	.01	.03	.01.37	
Beliefs	—	.04	—	—	—	—
Family Members	—	.02	—	—	—	—
Store Personnel	—	.01	—	—	—	—
Medical Professionals	—	.00	—	—	—	—

a. parameter estimate is statistically significant at: \*  $p < .05$ ; \*\*  $p < .01$ .

The chi-square difference of 7.62 between the alternative and null versions of Model 5 showed that the alternative form provided significantly better fit than its null version. The parameter estimate for the effect of suitability on attitude was statistically significant. But, the prediction of intentions equaled .01 in Model 5, a predictive ability that was no different from what was found for the baseline Model.

The null model for Model 6 yielded a chi-square statistic of 491.15 at 45 degrees of freedom, a CN of 85, and a coefficient of determination for intention of .01. Releasing the restrictions on the variables measuring product characteristics as contingent conditions yielded a chi-square statistic of 181.86 at 41 degrees of freedom, a CN of 213, and a coefficient of determination for intention of .37. The chi-square difference between the null and hypothesized models equaled 309.29, which was statistically significant. The parameter estimates for lower prices, more

recipes, and seeing advertisements were statistically significant. Thus, the model statistics — in particular, the coefficient of determination for intentions of .37 compared with coefficients ranging from .01 to .03 found for the other models — indicated that Model 6 provided the best prediction of Japanese consumer intentions to eat U.S. beef.

## DISCUSSION

We found that among the size models tested, the one that specified contingent conditions derived from the innovation-decision process of the diffusion of innovations model best predicted Japanese consumer intentions to continue eating U.S. beef. A potential limitation to these findings is that the Japanese respondents, in keeping with their cultural traditions, might have provided “congenial,” but inaccurate, responses to the items measuring beliefs, opinions of significant others, attitudes, and subjective norms. The observed attitude- and subjective norm-intention indeterminacies, therefore, might reflect measurement error rather than contingent conditions. If congenial, but inaccurate, responses were supplied for the theoretical determinates of intentions, however, it seems reasonable that similar feelings would have guided responses to expressed intentions, which would have yielded consistent, but inaccurate, attitude-and subjective norm-intention relationships.

We were presented with some potentially troublesome philosophical problems when attempting to account for product characteristics across different proposed approaches to resolving indeterminacies in the theory of reasoned action. We envisioned that considerations of expense (i.e., relative advantage) and suitability (i.e., complexity) could affect respondents’ perceived behavioral control over eating U.S. beef and therefore be used within the theory of planned behavior (i.e., Model 4). At the same time, using an approach suggested by Fishbein and Ajzen (1975), we thought these same variables could be considered as beliefs within the theory of reasoned action (i.e., Model 5). But, as specified in Model 6, product characteristics represented contingent conditions regarding the ability to adopt the behavior of eating U.S. beef. Thus, another way that our measures of product characteristics might have been interpreted was as measures of perceived behavioral control—under specified conditions (i.e., lowered prices).

This specification would have made for a more simplistic integration of the innovation-decision process with the theory of planned behavior. But such an integration would have obscured important philosophical differences existing between the two theories. First, the innovation-decision process implies strategies for planned change that emphasize the importance of intervention at all points of the hierarchy-of-effects decision-making process, rather than on changing beliefs, perceived opinions of significant others, and perceived behavioral control.

Second, the innovation-decision process emphasizes the role of outside agents in providing the actor with perceived behavioral control rather than the actor's internal processes of perceiving greater control. Finally, as Ajzen (1989) notes, the perceived behavioral control concept might not be realistic in cases where the actor has little familiarity with the behavior, such as is the case with innovations. In conclusion, the findings here indicate support for strategies of planned behavior change that incorporate elements of the innovation-decision process.

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