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Clarification of Cumulative Attractivity as a Concept and Its Measurement: Comments on Lue, Crompton, and Stewart

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The development of multidestination models is an important area of tourism research in which a very limited number of studies have been published. As was made clear in Lue, Crompton, and Stewart (LCS) (1996) a key concept in this literature is that of cumulative attractivity. Unfortunately, it appears that this concept was inadequately operationalized and therefore a number of inappropriate conclusions were drawn. This commentary challenges three aspects of the research reported in LCS, with the intent of stimulating further research is this area. Specifically, the three issues are: (1) the concept of cumulative attraction was not adequately operationalized; (2) the experimental design was inadequate to address the goal of the research; and (3) the interpretation of results is problematic due to the scaling clamping and the lack of recognizing individual differences.

DEFINING AND OPERATIONALIZING THE CONCEPTS OF CUMULATIVE ATTRACTIVITY

Lue, Crompton, and Stewart (1996) (LCS) refer to at least two different concepts of cumulative attractivity, including trip multiple destination cumulative attractiveness (TMDCA) and trip-destination(s) attribute attractivity (TDACA). In their discussion they acknowledge attractiveness as something recognized by individuals as a factor that influences their decision making. In particular, LCS refer to Nelson's (1958) individualistic concept of trip multiple destination cumulative attractiveness (TMDCA). Nelson suggested that multiple destinations may increase the perceived attractiveness of a trip. LCS also argue that the attractiveness of tourism destinations is determined largely by destination attributes. Gearing, Swart, and Var (1974), Lew (1987), Mill and Morrison (1985), Pearce (1982), and Ritchie and Zins (1978) are cited as references supporting this proposition, and it is suggested that there is a general agreement on what destination attributes are important. These references may be described as specifying activities, services, and so forth that "contribute" to an individual's perception of destination attractivity; thus, they relate to a general class of trip-destination(s) attribute cumulative attractivity (TDACA).

Early research on attractivity did not address issues related to the individual and choice but rather focused on measuring a destination's attractivity in an aggregate sense. One sees this in Cheung (1972) and Cesario (1973), where, respectively, the attractivity of a destination is defined in terms of its attributes and the purpose of some of the research is to explain estimated attractivity based on a destination's attributes. Literature is cited in LCS in which a zone's (Baxter and Ewing 1981) or region's attractivity (Kim and Fesenmaier 1990) is the focus. Lue, Crompton, and Fesenmaier (1993) do much to integrate ideas related to the different destination cumulative attraction concepts (i.e., TMDCA, TDACA, or regional attractivity) and introduce the concept of destination economic cumulative attractivity.

In the LCS study, however, neither cumulative attractivity concept (TMDCA nor TDACA) was selected for analysis. This leaves it to the reader to guess what is meant by cumulative attractivity. Perhaps most important, however, measuring destination cumulative attractivity does not appear to be possible because the LCS experiment included only a limited set of secondary destinations. Trip destination cumulative attractivity exists independently of the trip options offered to respondents, and, thus, cumulative attractivity was not varied in the experiment. For destination attractiveness to vary as a function of scenarios, trips to a variety of unknown base camps, with given supply of secondary trips, would have to be described.

MEASURING CUMULATIVE ATTRACTIVITY EFFECTS IN AN EXPERIMENT DESIGN

Figures 1 and 2 describe the two individual level trip cumulative attractivity concepts (TMDCA and TDACA) and discuss the consequences of having two levels of the time and expenditure constraint (referred to hereafter as the time and money constraint) using the LCS experiment design. Figure 1 presents a series of hypothetical model parameters for the constraint of a five-day trip with a $250 expenditure, while

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FIGURE 1

HYPOTHETICAL ESTIMATES OF AN INDIVIDUAL CONJOINT MODEL FOR OUTPOST TRIPS FROM AUSTIN FOR A FIVE-DAY VISIT TO THE AUSTIN AREA ON A $250 BUDGET

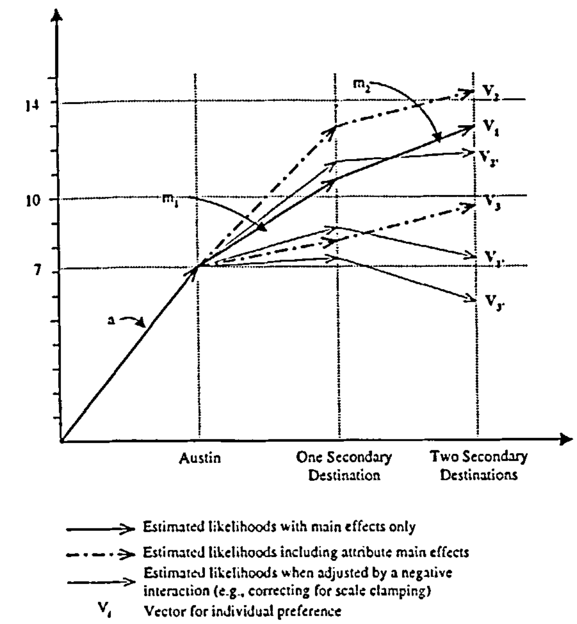

FIGURE 2

HYPOTHETICAL ESTIMATES OF AN INDIVIDUAL CONJOINT MODEL FOR OUTPOST TRIPS FROM AUSTIN FOR A THREE-DAY VISIT TO THE AUSTIN AREA ON A $150 BUDGET

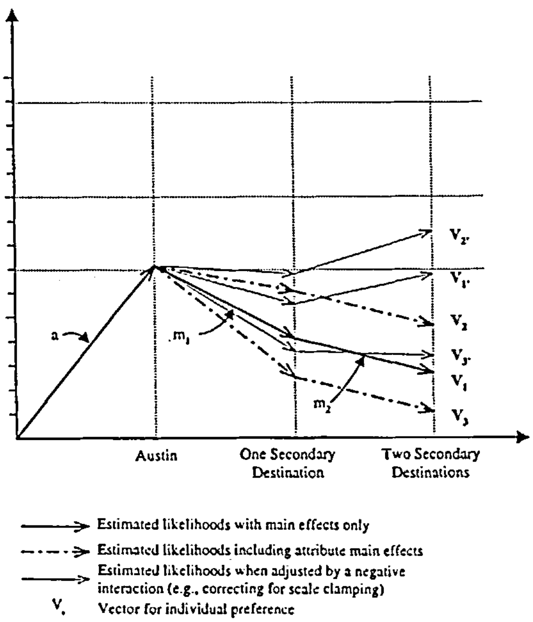

Figure 2 shows the parameters for a three-day trip with a $150 expenditure. In both figures, three categories are identified on the horizontal axis: (1) Austin, (2) Austin and one secondary destination, and (3) Austin and two secondary destinations. Figures 1 and 2 show Austin as having a fixed base likelihood (i.e., y-axis = 7), regardless of whether trips being considered involve one secondary or two secondary destinations (the only options studied by LCS). The value of seven is a plausible one since from LCS (LCS, Table 2, p. 45) one finds the values of the intercept, M1, M3, and U add to 6.42.

It is useful to think of Figures 1 and 2 as describing individual trips that are defined by a vector with the elements V_i. The lines in the figures show partial utility estimates with differing levels of treatment factors. Notations have been adopted that are typically easily recognized in terms of the concepts and variables. An Austin base camp effect (e.g., the y-intercept) is represented as a. TMDCA(1) and TMDCA(2) are abbreviated as m_1 and m_2, respectively. The main effects for one secondary destination are represented as $ft_1(x)$ and $fr_1(y)$. Here x and y refer to attribute levels that can be 0 or 1 and $ft_1()$ and $fr_1()$ identify effects for tourism services and relaxation/sport, respectively. Subscripts d and b identify effects with one or the other of the two secondary destinations. The subscript * is used as generic term to represent all secondary destinations where secondary destinations do not matter in an experiment. If two secondary destinations have symmetric effects, the main effects can be shown as $ft_{2,*}(1) = ft_{2,d}(1) = ft_{2,b}(1)$. Thus, three points on V_1 of Figures 1 and 2 are: a, $a + m_1$, and $a + m_1 + m_2$, which can be described as the generic effect of adding a destination. The three points defining V_2 and V_3 of these figures are: a, $a + m_1 + ft_1(1) + fr_1(1)$, and $a + m_1 + m_2 + ft_{2,d}(1) + fr_{2,d}(1) + ft_{2,b}(1) + fr_{2,b}(1)$. These lines describe a range of possible responses to the addition of one/two secondary destinations. The three points on other lines are for other combinations of parameters as represented by $V_{1'}$, $V_{2'}$, $V_{3'}$.

To see the value of the figures in providing clear definitions of different cumulative attractivity concepts and the relation of regression coefficients to these, first consider that Figures 1 and 2 illustrate the concept of trip multiple destination cumulative attractiveness (TMDCA). Expected likelihoods (i.e., partial utility levels) are shown for an individual planning a variety of different trips with a given time and money constraint and multiple secondary destinations (i.e., secondary locations with fixed destination attributes 50 miles from Austin, and, when there are two secondary destinations, they are separated by 50 miles and accessible from Austin in about the same amount of time). It is reasonable to describe m_1 as a measure under the given conditions of TMDCA when adding one secondary destination to a trip. When two secondary destinations are included, the expression of interest is: $a + m_1 + m_2$ (V_1). In this case m_2 is the incremental effect of adding one more secondary destination. In Figure 1, m_1 and m_2 are shown as being positive, but in Figure 2 both are shown as negative.

If secondary destinations are not identical in destination attributes, many issues arise. First, what about the relevance of the kind of curve just described if virtually identical secondary destinations are at different day-use driving distances from the outpost (e.g., Austin)? At least in principal, if secondary destinations were at different distances, one can conceive of using some kind of gravity model formulations to "standardize" on or "control" for distance, making the TMDCA concept somewhat less restricted than if every unique spatial configuration is seen as uniquely related to a different TMDCA function. Regardless, based on the preceding discussion, the following definition is one to consider:

The TMDCA of a destination for a particular type of secondary destination is a function defined on the positive integers, n, that for each n gives the increment in likelihood of adding an n^{th} secondary destination to a base camp trip.

In terms of some practical ideas about the TMDCA function, examples of different segments may provoke some fruitful thought for future research. Consider first that for one segment the important secondary destinations are shopping complexes. Some individuals might try to visit one such secondary destination each day that it is possible to do so. For a five-day trip this might mean three visits (not on day of arrival or day of departure). For such individuals each new destination might add as much to their overall utility as the first, but when fitting in shopping on the day of arrival and on the day of departure becomes part of the scenario, one expects less enthusiasm or even an indication that a trip with five day trips for shopping would be too much. Nonetheless, it is also interesting that LCS dropped consideration of attributes that would include cultural heritage based on an intermediate stage of respondent screening. For a segment interested in heritage, the ability to see two or three important historic sites could elicit large positive cumulative effects given an adequate budget and, say, five days. As for segments with interests in sports and relaxation, secondary trips may sound contrary to their purpose; however, travel to golf or for spring season baseball in Florida could be part of these individuals' day trips. In other words, there is no a priori "typical form" for a multiple destination cumulative attractiveness function, and when segmentation does not occur, such a function may be composed of a variety of segments exhibiting quite different behavior.

Although secondary destinations have been designated by d and b, it is important to note that the LCS design is symmetric with regard to these (i.e., there are no ordering effects in terms of which secondary destination is to be visited first). It is symmetric in that one secondary site does not need to be identified as d or b; that is, one does not require the notation $ft_{1,d}(1)$ or $ft_{1,b}(1)$. With two secondary destinations this means that by design, $ft_{2,d}(1) = ft_{2,b}(1) = ft_{2,*}(1)$, $fr_{2,d}(1) = fr_{2,b}(1) = fr_{2,*}(1)$, and $edistance_{2,d} = edistance_{2,b}$. These equality conditions that are not recognized by LCS could have been imposed in estimation. As it is, one sees from LCS's Table 4 that $edistance_{2,d} = 1.06$ and $edistance_{2,b} = -.29$, $ft_{2,d}(1) = 1.57$, while $ft_{2,b}(1) = .51$, with both appearing to be significantly different. The values for relaxation and sport, $fr_{2,d}(1) = 1.88$ and $fr_{2,b}(1) = 1.29$, can readily be accepted as coming from $fr_{2,*}(1) = .5\ (1.88 + 1.29) = fr_{2,d}(1) = fr_{2,b}(1)$. Estimating one parameter rather than two gives one value, which eliminates one area in which an error can be made, and this is appropriate. It also increases the efficiency of the estimation, thereby reducing the probability of accidentally drawing incorrect conclusions. The importance of having a correct value for $fr_{2,*}(1)$ will become clear when the importance of the relationship between various parameters, including $fr_{2,(d,b)}()$ and $ft_{2,(d,b)}()$, which are the subject of special attention by LCS, is discussed below. In the present context one may note that LCS do not discuss $ftr_{db}()$ (the interaction parameter between sport facility and tourism service between two secondary destinations), which is another parameter for which the (d,b) symmetry has implications. This parameter can be described as an indicator of variety-seeking behavior (Lue, Crompton, and Fesenmaier 1993).

As indicated above, the reason that Figure 1 and Figure 2 are shown to radically differ is that parameters were selected to show that respondents describe possible scenarios when travel to two secondary destinations is considered negative when only three days and \$150 are budgeted. This highlights an important problem in that the LCS research assumes that the influence of the time and money constraint can be captured in single parameter. Although proof is an empirical matter, it is suggested that it is more reasonable to think that going to two secondary destinations in three days given a \$150 budget is going to be viewed quite differently (not just explained by an additive constant) than having five days and \$250 to visit Austin and two secondary destinations. In fact, raising the matter of what changes with the time and money constraint suggests some interesting research hypotheses that may even be testable with the LCS data. If one accepts that, in a respondent's mental arithmetic, parameters such as $ft_{2,*}(1)$ and $fr_{2,*}(1)$ are actually based on $fr_1(1)$, then one can impose this as a constraint and/or test its validity as a hypothesis. Such constraints help resolve identification problems that arise when, as discussed subsequently, one addresses the matter of what a null hypothesis should be for assessing the TMDCA and the TDACA.

Before one questions whether, for a given time and money constraint, Figures 1 and 2 conform to the class of models implied by LCS, some points should be noted. First, LCS did not apply a constraint that forced Austin's estimated likelihood to be constant for an individual. As already noted, a constant for an individual in no way suggests that it does not vary, reflecting a respondent's orientation to Austin as a base (e.g., reflecting where the respondent comes from as well as a general perception of Austin as a destination). LCS's inconsistent use of cluster variables (U and V) to estimate a translation transformation (an additive constant) may do little more than cause the regression estimates to be based on inappropriate segments. The classes used appear to be heavily based on a respondent's average stated likelihood of visiting Austin. Furthermore, using the estimated translation transformation has at least one serious theoretical implication. It implies that likelihood has no real zero point (i.e., that it is not a ratio scale).

Inasmuch as likelihood is related to probability, LCS's Table 2 implies that the same effect coefficients apply to respondents whose mean response was 5.03 (group = U) as for those with a mean response of 1.7 (group = V). Now, consider that 5 was viewed by a respondent as a 50% probability of visiting, while a response of 2 meant a 20% chance. A value of $s_1 = 1$ (where s_1 indicates the number of secondary destinations) results in probabilities of 60% and 30%, a 17% change in the one case and a 50% change in the other. Is this believable? It is argued that it is more plausible that the values for an individual in a particular segment are proportional in magnitude to the base likelihood of going to Austin. In other words, LCS appear to have done little else than assume that a linear structure will explain likelihoods. Although the structures that are shown in the figures of this article are linear and do not include the interactions studied by LCS, they could. Thus, the figures only differ from the structures allowed by LCS in that they show that different parameters are to be expected for different values of the time and money constraint (or one could say that there are interactions involving this term that are ignored by LCS).

An important consequence of viewing different likelihoods as vectors with differentials that reflect the reaction to treatment is it allows one to place the LCS segmentation into context. If their likelihood data were based on m identical design vectors obtained for each person, one condition for valid segmentation would be met. This relates to comparing comparable quantities in measuring distance between individuals. However, if the argument in support of proportionality of effects is accepted, clustering should be done using the cosine measure (see SPSS Professional Statistics, Chap. 5, for information on the cosine measure) and, in fact, the transformed data are what should be analyzed to determine regression coefficients.

RESULTS THAT MAY OCCUR FOR THE WRONG REASON

It is important to note that the negative interaction observed by LCS could simply be the result of what may be described as scale clamping. Figure 1 illustrates how a model for an individual could result in estimates of likelihoods that exceed 10, the maximum scale value of LCS. One may think of results in that figure as being based on coefficients derived from responses on scenarios for which no response exceeded 10. Alternatively, one may ask what responses a person would have given if the ones in Figure 1 are what they should have given.

Consider that parameters for second secondary destinations are invariably smaller than for a first secondary destination. From this finding one must conclude that there are distortions in the magnitude of responses. Specifically, from LCS's Table 4 one may note that for $ft_{2,d}(1)$ = A = 1.57 > .51 = E = $ft_{2,b}(1)$; for $fr_{2,d}(1)$ = C = 1.88 > 1.29 = G = $fr_{2,b}(1)$; for distance B = 1.06 > –.29 = F. As noted earlier, given that, by design, A = E, C = G, and B = F, one must conclude that a person's mental arithmetic was such that even though secondary destinations one and two should have the same parameter values, respondents realized that their total likelihood was too large, so they changed how they added in factors. Given the symmetry in the design, what is observed implies clamping, even though responses were not near 11. In other words, there are scale distortion issues to address which, from the published results, one expects contribute to the negative interaction observed. Given that the effect just described would not have been observed if the equality of the parameters had been forced in estimation, it is fortunate that LCS did not recognize the appropriateness of the equality condition and therefore enforce it as part of the estimation.

CONCLUSION

It is argued that the work by LCS is at the forefront in research on cumulative attractivity and, as such, they are advancing ideas that have not been subjected to the same kind of conceptual development and methodological scrutiny that has occurred in more mature research domains. However, while we take exception to many specific matters pursued by LCS, we heartily endorse their conclusion that improvement of models related to multiple destinations and attractivity is necessary. The importance of recognizing that models for the various types of trips (i.e., outpost trips, etc.) can be expected to differ from models for other types of trips is acknowledged. Furthermore, the use of conjoint and choice models, and the associated designed experiments implied, is seen as critical to research advances.

Based on the issues presented in this article, we suggest that a variety of research initiatives are needed to extend understanding of the cumulative attractivity concept. We believe that the suggested approaches can guide further research in a productive direction. Furthermore, it is hoped that these comments encourage additional discussion by allowing LCS to explain what may have been misinterpreted based on others' reading of their text and by encouraging critique of the arguments presented here.

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