CHAPTER X: TN 33- UNITY IMPLICIT IN THE CORD STUDY ANALYSIS

By J. Beaman and N.H. Do

TN 33: A UNIFIED FRAMEWORK FOR UNDERSTANDING CANADIAN OUTDOOR RECREATION DEMAND STUDY RESEARCH

PURPOSE

The purpose of this Note is to show the inherent unity that pervades the Canadian Outdoor Recreation Demand Study research work by showing how modelling behaviour has ultimately led to the development of theory and methods that aid one in appreciating both the nature and complexity of interrelationships between apparently differing research areas. There is also some concern with how modelling relates to the development and/or testing of allocation and allocation evaluation methodologies.

INTRODUCTION

Canadian Outdoor Recreation Demand Study research started out as a collection of relatively disjointed tasks. As one can see from the chapters in this volume, that origin modelling, destination modelling, the study of attractivity etc. were seen as relatively autonomous research areas. But, something rather revolutionary happened when it was recognized that the Cesario model (TN 4), to be interpreted in a behavioural way, should be generalized so that an alternative factor was introduced into Cesario's city emissiveness (see TN 11). This recognition began to bring together other disjointed observations to form an increasing picture of unity between different research projects. When studying attractivity in a comparative perspective (TN 9) it was found that to explain the difference between site specific attractivity factors and general attractivity factors for the use of a park based on people's behaviour, there was at least some evidence that a kind of destination alternative factor should be introduced. Pursuing loose ends in TN 1 resulted in developing TN 3 on alternative factors. In TN 3 both origin and destination alternative factors were eventually considered. It was also noted that in the 1971 proposal for an overnight use model (TN 30) an alternative factor has been suggested which turned out to be essentially the one that was independently introduced into the generalization of Cesario's model to explain the "supply generates demand" and other effects (TN 11).

It is in the context just introduced that this paper was conceived. This paper is to include discussion of further generalization of the Cesario model (beyond TN 11). Prior to presenting the specific generalizations finally arrived at and in the way of further introduction it is useful to consider what is already implicit in the Cesario model and what may constitute a generalization. For example, one may ask what happens when a particular park or facility is improved in some respect. Suppose that one observes that there is an increase in participation. This change in realized demand can be attributed to five more or less distinct sources according to Burton (1971);

1. Existing demand - growth in actual demand;
2. Latent demand - previously frustrated demand;
3. Induced demand - no desire until opportunity presented itself;
4. Diverted demand - diverted from a similar facility elsewhere;
5. Substituted demand - substituted from one type of facility/activity to another.

It is possible to suggest that "demand elements" one to four above are included to some extent within the Cesario model. Existing total demand is characterized in the Cesario formulation through the inherent emissiveness of a city modified by the "supply generates demand alternative factor" effect. Latent demand can be associated with time budget variables which are not presently identified on the Cesario model but which according to some Technical Notes can and should be considered (e.g. TN 8 and weekend, holiday and weekday use of destinations). With weekend and holiday and weekday models, new participants are implied, by the models to see an opportunity that is within their time, money or other constraints when a time budget change in holidays takes place. Previously they may have been "prevented" from participation but socio-economic changes, such as a move to a 4 day work week, mean that weekend-holiday models apply to 3/7 or more of the days in a period whereas a weekday model is only appropriate for 4/7 not about 5/7 of the days. It is hard to say whether existing or latent demand or both relate to the proper consideration of "time bias" as introduced into the Cesario model in the appendix to TN 38. If people are willing to pay a money price, but not willing or able to pay the time-distance price for use of a site, is the increased use of a new site, that is closer but for which the users pay the equivalent of travel costs, a reflection of prior frustration of existing demand, or of something else?

Finally "Induced" and "Diverted" demand have clear interpretations. Induced demand should be identified with "the supply generated demand effect" since it is an effect that by definition, relates increased participation to extra participation "induced" by increasing supply. For diverted demand, one need only recognize that attractivity changes alter peoples choice of a destination. So understanding induced demand in relation to the Cesario model involves understanding the formula that indicates how total trips generated by an origin are prorated to destinations depending on their locations and attractivities. In commenting on how the various demands can be identified in the Cesario model one may have noticed an undesirable vagueness particularly regarding the first two types of demand. And, though there is some vagueness with respect to all of the first four types of demand it Is somewhat distressing to notice that substituted demand is irrelevant in the Cesario model. At least this is the case until destination alternative factors are introduced in the next section of this paper. Then substitution at destinations is considered. In Section 3 of this paper the Cesario model is elaborated upon; so one also sees how substituted demand can be identified in an origin based substitution mechanism. Still all of the 5 "types of demand" referred to here are not very clearly defined and do not relate to one well-defined behaviour of people. Specifically in the paragraphs above, there was no emphasis on the types of user groups for which different Cesario models should be formulated. Demand will be affected differently by changes in supply for different types of users. Different models are necessary for different types of users, for different time budget considerations such as annual vacation, weekdays after work, weekends etc. Having such models is a critical matter in developing a better understanding of behaviour and particularly a better ability to predict behaviour.

The importance of considering user groups has been stressed elsewhere in this volume (see TN 7, 18, 30, 40, etc.). Having or using different models is only mentioned here because recognizing the need to develop different models, for flows for which attractivity or city emissiveness will differ, is as much a "generalization" of the Cesario model as showing the possible structure of emissiveness (as done in TN 11) or as introducing destination alternative effects and origin substitutability of activities as is done in this paper.

It is however because of (1) the need for using different models is well known and because of (2) the few theoretical insights following from anything that is or would be developed in this paper that no more is included on the matter. Still, this class of generalizations if pursued in considering time constraints, capacity of site constraints, influence of exogenous variables such as weather (short term) or changes in roads (long term) leads to interesting and extremely complicated dynamic model formulations which as indicated in TN 40 must ultimately be developed if really good solutions to visitor flow and visitor generation by origin problems are to be found and used where now only questionable estimates are made.

GENERALIZATION 1: THE DESTINATION ALTERNATIVE FACTOR

Consider that a person is contemplating making a trip with certain activities in mind and that destination areas at which to carry out a main activity are thought about. Does 0ne think in terms of attractivities that are “named-destination” (e.g. park X) specific? Though this impression was left in the way TN 11 was written, and is implied in TN 4, this need not be the case. It is possible that factors other than characteristics of a particular “named-destination” may influence the attractivities that a person perceives. These other factors may be such that when the Cesario model is used to estimate "park attractivities" the attractivities estimated may not only depend on things about the “named-destination” for which they are estimated but *on activities that are available around it*. One may recall that in TN 4 Cesario has stated that attractivity which is a property of a destination should not be affected by changing a destination's location. Implicit in this statement is: "other things being equal". But the question is: WHAT other things being equal? One is left with the impression that the other things that are to be controlled for are the effect of distance and the effect of the different city emissivenesses on the use of a particular site. It is hard to read into Cesario's statements the notion that the attractivity of a park and its invariance with location involves invariance only holding when one is considering moving other parks along with a particular park to preserve a particular park's attractivity. Nevertheless, consider the problem that arises when a municipal authority, a provincial authority and a national authority along with private developers create a collection of complementary facilities all of which may be fairly similar. The user of any one facility may perceive the value of the opportunity that one has in terms of the value of the total resource base available, including the possibility of using a federal campground if the provincial campground (e.g., “named-destination”) is full etc. If one were trying to understand the attractivity of each of these parks and one carried out a Cesario type analysis to estimate their attractivity (TN 4) and one only based their analysis on characteristics of specific sites they could expect that they would not explain the attractivities of the particular sites well. If they recognized that an attractivity coefficient estimated using the Cesario model probably varies in relation to characteristics of a sites and the composite collection of sites around it, and carried out their analyses with appropriate variables then they could expect better results.

The preceding paragraph may, however, seem rather obtuse. So now consider that the Cesario attractivity, A(d,x,g), for a park for a main activity x does depend on what is in and around a “named-destination,” d. The component of attractivity that does not depend on surroundings may, for example, be called the inherent attractiveness, IA(d,x,g), for the park for x as perceived by the certain type of user from a group g who is being considered because members goes to d for a certain type of visit (e.g. weekday use for a picnic: on use classification see e.g. TN 8 and TN 30). In the context given, it is quite conceivable that "Cesario attractivity” would be somewhat as follows:

(1) $A(d,x,g) = IA(d,x,g)\, S(d,x,g)$

$$\text{WHERE } S(d,x,g) = \frac{IA(d,x,g)\, e^{scx(d,x,g)}\, EXT\,(d,x,g,A)}{\Sigma_a\, IA(a,x,g)\, e^{-P(x,g)D(d,a)} e^{scx(a,x,g)}\, EXT\,(a,x,g,A)}$$

P(x) is the effect of distance for people in a group, g, carrying out main trip purpose related activity

D(d,a) is the “signed” distance/time-distance from d to alternative location, a (the + or –

net actual difference in distance/time-distance for going to “a” rather than to “d”.
SCX(d,x,g) is the substitutability-complementary exponent for activity x which indicates the positive or negative influence of similar activity being available at other like nearby facilities (e.g., if SCX(d,x,g) =-ln(2) then the “effect” is ½), and
EXT(d,x,g,A) is a function described immediately following which indicates the influence on A(d,x,g) of the availability of activities defined in the activity vector A, other than x when these other activities are available to the users of d outside of the destination d but relatively near to it.

No explicit form of the function EXT(d,x,g,A) is given here. One need only understand that this function indicates how the availability of activities which are not related to major trip purpose but which somewhat influence one's decision about where to go should be taken into account in assessing a destination’s Cesario attractivity. Having some kind of amusement park facilities in the vicinity of a “named-destination” may influence certain types of user to go to it. Also, this may influence other types of users not to go there so that in the one case the value of EXT(d,x,g,A) can inflate A(d,x,g) and in the others depresses it. The critical point is: For some group of users, g, who are homogeneous in the way that they react to given circumstances when they are contemplating a trip of a given type for a given purpose, it is reasonable to claim that their trip making behaviour can be influenced by what is near to a “named-destination”. The kinds of activities available around a “named-destination” can influence who is attracted there. It is such influences that should be considered to be embodied in the EXT(d,x,g,A) function.

Before continuing, it seems important that the reader should note that the "Cesario attractivity" is the attractivity that would be estimated if one used the Cesario model to estimate the parameters of a model for trip distribution flow for the people in g who, for example, went to the particular site for picnicking on a weekday during a given season. In that context, if emissiveness "works" the way that it is postulated to, Equation 1 shows that the Cesario "attractivity" need not be site specific but may be influenced by external factors and by "competing" or "complementary sites for the activity x." This is true because an A(d,x,g) defined by Equation 1 would be estimated correctly using the analysis of variance of trip flows as described in TN 4. IA(d,x,g) would not be estimated unless, as indicated later, d is an "isolated" destination. The difference alluded to relates to the difference between Cheung’s location specific attribute based attractivity and Cesario measures of attractivity (TN 9).

The reason that a main activity x is stressed is that the formulation presented above is not at all appropriate for camping when the dominant activity on a trip is something like visiting relatives (VFR) or accommodation for visiting Ontario Place, Fortress Louisbourg, etc. When a “destination” at which one stays is simply a location to gain access to the main activity. In such circumstances the model is certainly not appropriate for assessing destination area attractivity. The kind of situation just described is a circumstances associated with much camping on Prince Edward Island during the summer.

Finally the remaining and the key idea being suggested in Equation 1 is that if there are a number of facilities at which an activity x can be carried out by a particular type of people who are being considered, the inherent attractivity of one site influences Cesario attractivity of another. For people in group g with a particular trip purpose, one can picture sites in some sense emitting potentials so that a person thinking about a given location perceives the potential for that given activity. (TN 5 and 17 present methods of measuring potential or pressure.) However, one does not necessarily perceive “potential” for, say d, but is considering (1) the inherent attractiveness of a given site (2) augmented by the inherent attractiveness for alternative “sites” deflated by some function of distance. The function of distance can be considered to express how a person would react to the separation between the particular destination d which may be thought of at a given moment and its alternatives. These are reacted to somewhat as if one was at d but if “a” is closer to the origin for travel, it is reasonable that distance or time-distance to “a” from d be considered negative so a’s effective attractiveness is enhanced. So, the "impedance of distance coefficient", P(x), is not necessarily the same impedance of distance coefficient that applies to travel by the particular type of people for their particular type of trip from their origin to destination d. An impedance coefficient of .05 which may apply with respect to travel from the origin to d is possibly larger than the P(x,g) of Equation 1. In thinking about d, a person might see distance as offering a greater impedance, say an impedance of .13 which shows a rather strong reluctance to travel more than a few miles while giving a closer destination an attractivity “bonus”.

The ideas suggested above may be clearer if one notes what Equation 1 implies under certain conditions. If for example a site is "isolated," S(d,x,g) is close to 1.0 because there are no external influences. Then, using the Cesario model consider that one estimates IA(d), site specific attractivity for the site. Now assume that the isolated site is divided into four parts which are close to each other and assume that all parts serve the some function and that each part receives 1/4 of the visitors. The Cesario model will show that each part is 1/4 as attractive as the whole. Given that travel distances between the parts are essentially zero Equation 1 is consistent with:

$A(d,x,g) = IA(d,x,g) = IA(d1,x,g) = IA(d2,x,g) = IA(d3,x,g) = IA(d4,x,g)$

In other words, each part may still be considered as inherently attractive by its users as the total park.

From the preceding the reader may already have concluded that SCX(d,x,g)=ln(1)=0 ($e^0=1$) is a critical value. For SCX(d,x,g)=ln(1) an given other isolation conditions, dividing a park does not affect the inherent attractivity of its "adjacent" parts. This only makes behavioural sense within limits for certain types of parks for certain types of users on certain types of trips. There is no anomaly in the fact that a park with 3 campgrounds each with their own resource base are each inherently as attractive as the three considered as one destination with 3 parts given that travel to the three parts takes little time. In other cases where an $SCX(d_i,x,g)$ of –ln(2) would be appropriate, its “appropriateness” could reflect that for some users making a "wild river" or wilderness park into 4 similar but “buffered” parks has an impact. For example, i= 1 to 4 by allowing 3 equally spaced non-wilderness access administration centers and recreation points along a “wilderness” river. For some this would detract from each “park” so that: $IA(d_i,x,g)=e^{-\ln(2)} A(d,x,g)=0.5A(d,x,g)$. If 1/8 of the visitors that did come to the original park go to each new “park”, each part of the park will only be seen to be inherently 1/2 as attractive as the whole and thus in total only 1/2 as many visitors will come *to the destination area* if the park is divided. As well, the opposite could occur with $e^{SCX(d,x,g)}$ being greater than 1. People who want the “new” recreation that a divided location offers could perceive the new offering as inherently more attractive and the parts as complementary alternative destinations fostering increased use of the general destination area (e.g., offering variety/experience options). In reality there need be no variety. It is interesting to conjecture on the use one mountain park would receive if Banff, Jasper, Yoho and Kootenay were combined.

The preceding paragraph provides good examples on which to comment on why there is a concern here with both complementary and substitutability. When the perceived and the inherent attractivity of a site is decreased, because of "competition" with or at least the existence of other sites offering one the same experience, it seems fair to say that the sites are substitutes for each other. But, if having several parks rather than one large one or having several destinations near each other where one can go if one area is full results in an increase in total use over what the destination area as a single entity would receive, then one can refer to the sites as complementary. To refer to these parks as substitutes would at least be a poor or misleading use of language. Obviously in terms of the examples in the preceding paragraph $e^{SCX(d,x,g)}$ greater 1 one defines a condition of substitutability whereas if $e^{SCX(d,x,g)}$ is less than one there is complementarity. Nothing more is stated now because the relation is commented on again later in discussing analogous origin based substitutability-complementary conditions.

One could pursue the intricacies of estimating the IA(d,x,g) values along with the other unknowns in Equation 1. However, then the kinds of problems discussed in TN 11 would have to be pursued since in the original estimation exercise if "Cesario attractivities" were estimated for 5O sites, only 49 independent estimates of attractivity would be available on which to estimate 50 inherent attractiveness values, an impedance of distance value, a substitutability-complementarity exponent and some parameters of a function EXT(d,x,g,A). Obviously constraints have to be introduced or parametric forms of the inherent attractiveness function must be estimated so that model parameters can be found. If one pursued the alternatives of defining the IA(d,x,g) in terms of site characteristics then they may note their estimation procedure would be the logical extension of the AID analysis of attractivity pursued by Cesario in TN 4.

GENERALIZATION 2: "SUBSTITUTABILITY AND THE DECISION TO PRIMARILY DO ACTIVITY "a" AT A MAIN-DESTINATION ON A "FAIRLY" SINGLE PURPOSE TRIP

For this generalization it was planned originally to present a formulation which was not developed with the Cesario model in mind. However, it was then recognized that the important ideas of concern could be elucidated by presenting a model for which "phase I" emissiveness and attractiveness values could be estimated as Cesario has illustrated (TN 4). So, rather than introducing new modelling concerns it was decided to further clarify what Cesario's parameters could mean when use of alternative facilities is allowed.

To present this final generalization of the Cesario model it is convenient to introduce it in stages starting with very simple assumptions and then introducing other matters which must be pursued if overly simplistic assumptions about what emissiveness means are to be relaxed. So initially accept that there is the kind of aggregate as indicated in the last section might be determined with the methods described in TN 10 or a group "g" as described in TN 19, the behaviour of which is being considered. Accepting that these people are assumed to be "homogeneous" in terms of their interest in the only main-destination activity, x, that is all people in the aggregate have the same probability of participating in the given activity in similar circumstances, (at the same location, on the same day of the week, under the same time constraints, etc.).

Now visualize that at a point in time any one of these people has a choice of going to a facility to participate in x or not going and that this decision is made in terms of "the potential" that the person perceives for participating in activity x. In the context of TN 5 one may consider that at every point in space at which this person might be, there are potentials to participate at different facilities and that these facility specific potentials are defined by:

(2) $P(o,d,x,g)=A(d,x,g)e^{-r(x,g)\,D(o,d)}$

WHERE A(d,x,g), r(x,g) and D(o,d) are as defined in TN 11 except that activity and type of person subscripts have been added.

Also, consider that there is an impact on total participation which depends on the best opportunity in a way defined by a weighted sum of potentials, *an alternative factor*, defined over each of the individual facilities at which a person might participate.

(3) Total Participation

$= M(o,x,g)AIU(o,x,g)TP(o,x,g)$

$=((P(o,d,x,g)/PP(o,d,x,g))^{SE})^{SW}PP(o,x,g)POP(o,x,g)CG(o,x,g)$

WHERE the terms are as defined in TN 11

In specifying the preceding, it must be accepted that a person (party or some other group) may be considered to have some rule according to which it is decided which of the alternative facilities available is to be visited to participate in x.The rule need not be explicitly defined but still trips to the different facilities may be made *in proportion with different potentials, in proportion to the potentials for participation that are "perceived" for each of the alternative facilities* (Equation 2). Then if expected total number of trips in a time period are defined in terms of reaction to "total" supply, as defined in Equation (3), the amount of use that wilt b. made of a site can reasonably be taken to be:

(3A) $V(o,d)=P(o,d,x,g)TP(o,x,g)$

An alternative rule for distributing use to sites is that people are economically rational in terms of potentials. In this case it would be assumed that one always goes to the facility with the highest potential. This formulation is not compatible with the Cesario model because zero flows from an origin to alt but one destination by people in a group g implies zero attractivity for the unused sites. But if some are used from other origins, then for these origins the first site has zero attractivity. These different "manifest" attractivities contradict the Cesario formulation which is according to "generalization 1" of this paper, at least based on the assumption that from all origins, a destination area's attractivity is the same for comparable users.

Regardless, at this point one should note that the considerations introduced in the last few paragraphs are very easily related to the matter raised in TN 29: How does a person relate to surrounding facilities and which in some sense offer opportunities to participate in an activity. In terms of Equations 1 to 3 an answer is offered. In a simple conceptualization one visualizes a person in some location "impinged on" by potential surfaces. For now, the person is not concerned about what activity to participate in but only where to go given the potentials for what is sought. Furthermore, there may be concerned about how often to go, whether to go under given weather conditions etc. but the decision processes involved in reacting to these factors are not pursued here (the equations here are really for a "seasonal average" rather than more detailed (as based on TN 8 methodology).

As indicated in TN 11 the kind of socio-economic variables considered in TN 12 and in other Technical Notes may be considered to define a general level of participation to expect for a person with given characteristics. Or, as pointed out in TN 10, 13, 32 and 37 it might be better to identify a person with an aggregate of people based on an activity package. But, the matter of importance now, is to consider that a person is never only exposed to the various opportunities to participate in a single activity. It is reasonable to ask how one's exposure to multiple opportunities, A, affects the choice to participate in a given activity, x. In the last section it has already been indicated that alternatives for the major activity or to the major activity that occur around a destination can be considered to affect "inherent" site attractivity, IA(d). For that reason the perceived or manifest attractivity, A(d), was used in the proceeding equations to show the direct influence on judgements of percieved attractivity. The equations could be written with IA

( )'e substituted for A( )'s but the authors believe this to be inconsistent with behaviour and with the TN 11 formulation in which the estimated A( )'s were used in deriving explicit expressions for origin alternative factors.

With the point about the importance of considering A(d) in minds now accept the obvious that a person perceives the potential to participate in a number of activities. How do these different potentials operate in affecting the person's decision to participate in a certain activity. For people in the same aggregate, group g, one may visualize the decision to participate in a activity as based on the "merit" seen to be associated with each activity in a collection of different activities based on where each person is with respect to various destinations.

For example* it is plausible to suggest that an individual chooses among activities so that the proportion of all trips which are made to participate in x can be expressed for a person in "g" who lives at "o" as follows:

(4) $PROP(x,g,o) = ws(x,g)PI\ C'(x) / \Sigma_a\ ws(a,g)\Omega\ C(a)'$

WHERE the sum is over all a in the activity vector A.

Ω is the row vector of potentials P(o,d,x,g)'s defined by Equation 2 for all a in A.

vs (x,g) is the weight that people assign to the "desirability coefficient of activity x" defined by PI C'(x) in measuring it against other such coefficients.

C(x)' is the transpose of a vector of complementarity weights c(x,y,g) which indicate how much having unit potential for y available "complements" negatively or positively participation in x(c(x,y,g) is by definition 1).

The stochastic or proportional distribution interpretation suggested above might be adopted to account for the fact that from day to day, activities shift. Shifts, may in fact be a reflection of the utility of changes in activity patterns. Basically the hypothesis introduced is that certain weighting vectors are appropriate at any point in tine to assess the merits that are associated with a particular activity for a person in a given aggregate. Specifically, one may note that Equation 4 is defined in such a way that if there is only one activity available to an origin:

(5) $$ws(x,g) = \frac{ws(x,g)P(o,d,x,g)c(x,y,g)}{ws(x,g)P(o,d,x,g)c(x,y,g)} = 1.0$$

It there are n activities that do not interrelate (e.g. c(x,y,g)= 0 for ($x \neq y$) and which have the same potential then one can derive:

(6) $PROP(x,g,o)=ws(x,g)P(o,d,x,g) / (\Sigma_a\ ws(a,g)P(o,d,a,g))$

Equation (6) implies that a person in g distributes activity to the various possibilities in proportion to their substitutability weighted potentials. This of course involves the implicit assumption that (1) the activities are equally substitutable in a "time slot" where participation in any activity can occur. This involves the activities being equally substitutable under different weather conditions etc. or it means that (2) in the aggregate participation frequencies average out so that Equation (6) can be used to explain what happens in the long run. It can show average substitutability based on the different size "time slots" being available, under different weather conditions etc.

In the context of the ideas presented in the last paragraph one can see that PROP(x,g,o) is a ratio which can be considered to reduce the inherent emissiveness, G(o), of a city for a given activity where alternatives are available. So, in the context of the generalization of the Cesario model introduced in TN 11, one is now saying that at least part of the C(1,0) and C(2,0) constant where said to relate to "city uniqueness" in TN 11 may not really reflect city uniqueness. In fact it people in group g in city 1 were compared with similar people in g with city 2 it is possible that, say in terms of main-destination day-use of parks, $C(1,1) \neq C(2,1)$ or $C(1,2) \neq C(2,2)$ merely indicates that these constants (defined in TN 11 only) equal the appropriate PROP(x,g,o) for the two origins and $PROP(x,g,1) \neq PROP(x,g,2)$. In other words, it is reasonable to suggest that Equations (3B) and (3C) of TN 11 should be rewritten to show that the C()'s do not "include" substitutability factors but only "truly" reflect city differences other than supply differences. One might for given x and g write:

(7) C(1,2,x,g)= PROP(x,g,1)CUNIQ(1,2,x,g)

(8) C(2,2,x,g)= PROP(x,g,1)CUNIQ(2,2,x,g)

WHERE CUNIQ()'s constants reflect city uniqueness.

Incidentally, the fact that Equations (7) and (8) are simply a new way of writing emissivenesses which can be estimated as discussed in TN 11 is proof that origin substitutability-complementarity may influence the values of E( )'s estimated using Cesario's “phase I” estimation. Given that this is true it also follows that if truly good models of behaviour are to be built, empirical work on assessing or measuring substitutability should proceed. However, given that results presented in TN 29 show how difficult and potentially costly it is to assess response to just one type of supply, it must be recognized that work on substitutability-complementarity should be carefully designed and proceed slowly from one success to another rather than being undertaken in a grand experiment. Any grand project will have little chance of success given the problems to be solved in "origin emissiveness" studies; and their relation to visitor flow analysis problems to be solved; and the relation of these problems to other problems as described in the next section of this paper.

Before turning to the next section some practical insights regarding "city uniqueness" and complementarity-substitutability may make the preceding formulation more understandable. Firstly regarding substitution, one may note that near some cities, Ottawa, for example, there are abundant opportunities for cottaging where in other locations this is not the case. In some provinces there are abundant crown lands that can be used for camping, hunting or fishing with few restrictions. In others one or all these activities are rigidly controlled. Now both cottaging (not in a park) and use of non-park crown land for camping "compete" with using parks for anything. When people allocate their finite time and money to participating in activities they make allowance for substitutes. So here one may note that formulae presented earlier should and do alloy the effect of having such substitutes available to be accounted for in estimating participation in activities. Complementarity is another matter. It has often not been dealt with adequately by those analyzing behaviour or proposing analysis strategies (see TN 37 and comments in TN 10 and TN 32). The opportunity to go shopping in Alma town site outside Fundy National Park or to drive for pleasure to the horse races and shop and eat in various places in PEI complement a visit to PEI National Park for a certain type of visitor but in this paper such influences should be related to Generalization 1 and destination alternative factors affecting a destination's inherent attractiveness. Rather, having a high potential at an origin to visit historic sites may not really relate to high emissiveness to picnic grounds because the attractiveness of particular picnic grounds is enhanced by historic sites being near them. People may picnic when or as long as the weather is good and then "retreat" to a complementary activity when the weather is bad. Another case is where a person would not go to a park unless the trip offered the complementary experience of a drive for pleasure. The general potential for driving for pleasure in going to parks from Ottawa may "enhance" the "raw" potential for visiting parks whereas traffic problems in Toronto or lack of scenery in Saskatchewan near Regina may reduce "raw" potential for park visits.

Finally, to focus again on an important concern, implicit in the idea that the person who is being considered is a certain type of person (the issue taken up in TN 10, 32, 37 and to some degree in notes like TN 8, 14, 37, 30) is the following. If a person is an outdoor orientated person with an orientation to exurban rather than urban outdoor activities then at a given point in time, let us say after work on a given day with good weather the person may have a greater tendency than an athletic activities oriented person to rush outside the city to some area for a brief hike. The other person alluded to might go to a nearby tennis court and play tennis or to go to an indoor area and play squash. But returning to the main concern if both persons referred to are confronted with the same geographic configuration of facilities at which to carry a number of different activities (which may also include social and cultural activities) and have the same time constraints and weather conditions each may be viewed as perceiving different attractivities for different facilities and thus as assigning different weights to the merits of carrying certain activities.

Now, it would be possible to turn to estimation concerns in relation to Generalization II, but as was the case with Generalization I little is said. Certainly in 1976 from a modelling perspective it is not feasible to think that information for calibrating the kind of generalized model described here is available. Some detail must be sacrificed. So, one is in all practical studies dealing with a modelling approach that yields an "aggregate" solution for "an average individual" in particular circumstance. Such models can (or really must) certainly be adequate for most purposes for now. One for now must view the generalized model as a conceptual guide in research planning. It can be used in deciding where and how, simple models can be used in certain circumstances. However based on results presented in TN 11 one must accept that "Phase I" attractivity and emissiveness estimates based on the Cesario model are influenced by factors that are highly significant but which have not been explained by origin or destination characteristics. Until more is learned, even our best models cannot be expected to yield really accurate origin destination flow estimates. Possibly it is time to use the TN 19 methods for finding structural problems in models so as to derive better models as soon as possible, rather than continuing expenditures on poor ones without even establishing how poor they are.

DISCUSSION: THE UNITY IN THE CORD STUDY

Summary Overview

As suggested earlier in this paper when the importance of understanding what the Cesario emissiveness coefficient meant was realized, a path for discovering the unity in CORD Study research was opened. As work on TN 11 progressed the following possible elements of Cesario's emissiveness for an area were recognized in the formulation developed:

1. Its dependence on the general array of facilities of a given type available to a person in the area who wants to make a given kind of trip -
    a) depends on how total trips relate to the configuration of supply for an area and
    b) depends on how total participation at all facilities is prorated to specific facilities;
2. Its dependence on the "aggregate" socio-economic characteristics of people of the area;
3. Its dependence on the unique character of the area being considered; its dependence on either a special geographic character or a special socio-cultural character.The study of Cesario's attractivity measures for parks in an attempt to understand what it meant led to other insights already alluded to in the article:
4. Cesario's park attractiveness need not be considered a pure measure of how attractive a park is but for certain types of trips for a park may depend on what is around the park

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a) in terms of similar competing facilities and

b) in terms of different competing or "complementary" facilities; which may either add to, or detract from the attractiveness of the park being considered depending on what users in a given group there want.

Finally, the "origin based" substitutability considerations introduced show "how", in the context of the formulation developed in TN 11:

5. The inherent emissiveness of a city, which really applies to participation in an activity where there are no other activities to consider, can be properly dealt with if one introduces an effect on inherent emissiveness for an activity "a" of the opportunity to participate in other activities. It can be properly dealt with if one introduces an origin based substitutability-complementarity factor.

It has been repeated numerous times in commenting on the general logic behind the points received above that one must be concerned with (1) attractiveness to whom for what purpose, (2) substitutes for what type of person under what type of time budget, weather etc. constraints, If one cannot identify types of people, types of activities, tradeoffs between activities for groups for which they are meaningful, then there is no point in "identifying" them for behaviourally meaningless aggregates unless this can be Justified for developing an approximate model. The exception is if a model is built for policy purposes then any structure can be specified. It is perfectly valid to investigate how people would behave if ....or to investigate the ultimate consequences of encouraging behaviour that conforms to a given model. Regardless, the point here is that (1) to (5) above, in this "summary overview", should be thought of in terms of the behaviour of a particular person or a particular type of people, if the statements are to have the specific behavioural implications which they appear to have.

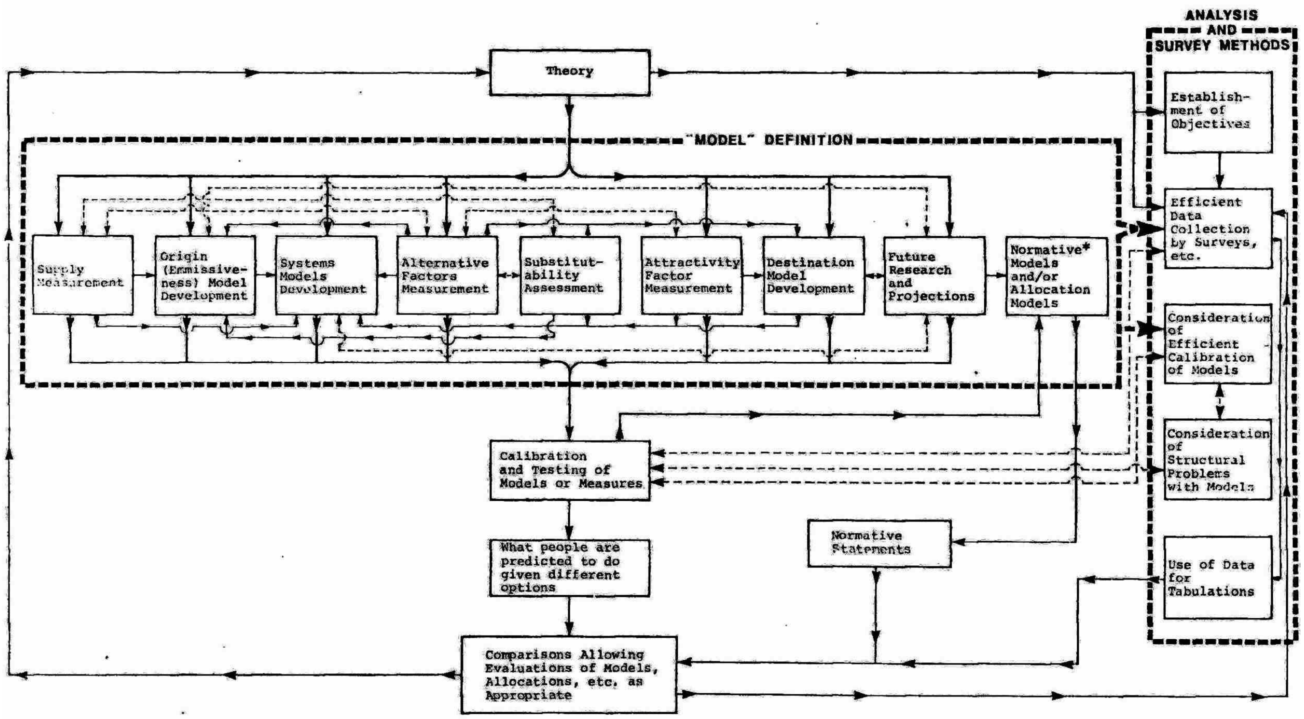
UNITY AND "ALTERNATIVE FACTOR MEASUREMENT"

However, enough has been said in general overview. It may not be clear from the terse notes that most of the interrelations indicated in Figure 1 can be understood in terms of the points raised about the Cesario model. For example, to start to see in detail why the connections between research concerns depicted do occur consider firstly how alternatives factors, their definition and measurement, relates to other research areas shown in Figure 1. Alternative factors in TN 3 have been the focus of theory development and "considerations of structural problems with models" work because of the way they were used in TN 1 and their proposed use in TN 30. In TN 1 questions were raised about the significance of the alternative factor but of more importance regarding "Calibration and Testing of Models" and analysis and survey methodology is the fact that questions raised about the CORD Study Park User Survey and the possibility of calibrating the models proposed in TN 30 resulted in the cancellation of empirical work on the "Overnight-Use Model".

In TN 1 and later in TN 11 one has clear indication of the importance of alternative factors in "Futures Research and Projections", obviously as new facilities are created and some old facilities are phased out, models must change to reflect the supply configuration with which people are confronted. Alternative type factors are obviously key model elements for reflecting this change. This is because they reflect very directly that when one is formulating destination models they should really (or are really) involved in "Systems Models Development".

A number of other observations point up how alternative factors keep being noted as important with respect to other research areas. An origin alternative factor appeared when the generalized Cesario model was formulated in TN 11. Also in this paper it has been shown that destination alternative factors should probably be considered if one is to truly understand what Cesario's estimated attractivities mean. Of more importance is that in TN 11 a link between Cesario's emissiveness values and the parameters of an origin model was specified. This is because the combination of "supply generates demand" effects of a prorating of use effect, and of an alternative type factor (of TN 11) can be seen to relate to the "effect of supply" or supply measurement problem considered in TN 29.

FIGURE 1: THE UNITY IMPLICIT IN THE CORDS STUDY ANALYSIS



ORIGIN (EMISSIVENESS) MODEL DEVELOPMENT

Though it is not worthwhile to deal with every heading in Figure 1 and discuss all possible relationships between headings, a second example may convince the reader of the degree to which "Model Definition" research should be integrated. Material in TN 11 on origin emissiveness has pointed up that alternatives to a given facility at which one can participate in an activity may influence origin emissiveness. Actually TN 29 can be viewed as another paper on how alternative supply and its measurement must be considered in measuring origin emissiveness. In TN 29 important statistical considerations, important analysis and survey methods concerning efficient data collection, model calibration and survey design are raised.

TN 35, the appendix to this volume, and the review for Chapter 7 concern statistical issues of importance in emissiveness analysis. Other articles deal with more behaviourally oriented methodological problems with origin models. They raise difficulties with the method of measuring origin emissiveness (TN 6, 13, and 20). Still, TN 13 relates the TN 12 work on applying origin models to "Futures Research and Projections" while TN 6 answers questions about the accuracy of estimates of origin emissiveness using the methods described in TN 12 and TN 13.

TN 10, TN 13, TN 32, TN 37 and some chapter review material raise important THEORY, "Calibration and Testing of Models of Measurement" and Normative considerations in relation to origin emissiveness. Such concerns as the equity of distribution of the emissiveness to different groups in the population relates to theory issues in TN 32, methodological points in TN 10, TN 13, and TN 37. Also they issue of how facility complementarity—substitutability affect origin emissiveness is broached.

OTHER MATTERS

The preceding has concentrated on origin models, destination models attractivity, alternative factors, the major effect of supply. One may ask is there any unity in the CORD study with respect to some of the other topics that were dealt with in technical notes. In Figure 1, it is possible to delineate three lines of consideration that do not have much to do specifically with the kind of modelling already mentioned: allocation modelling; design of data collection; and theory development and theory testing. The unity of the study with respect to these areas is fairly obvious. What one has seen in this article is in fact how the results of one empirical research project are interrelated with other research projects leading to theory development. In particular, with respect to research design, it should be noted that TN 6 with respect to origin models, TN 19 with respect to destination models, have presented formulas which have utility in determining what sample sizes are necessary if models are to be redeveloped that meet certain accuracy criteria. In a similar way one can see the explicit statements in TN 20 on how to improve origin models, and in TN 35 on how to improve destination models (actually, comments on improving destination models occur in a large number of TN including 3, 7, 40.)

And now starting from the perspective introduced in a number of places in this volume, it is consistent to maintain that allocation evaluation models need not be consistent with behaviour. Pressures computed in Technical Notes such as in TN 17 need in no way reflect real pressures felt by people. Rather, what the method may be used to do, is to produce a measure of people's relationships to resources. If they don't feel deprived at all then it may still be the case that a policy decision will mean that actions on their "needs" will be taken. Similarly, the question as to whether the potential surfaces generated by the methods described in TN 5 really reflect pressures that could be documented by a study is not necessarily considered to be a pointed issue in this volume. Unity in theory with theory or with empirical work is obviously of concern to some of the authors, as seen in TN 5.

SPECIAL RELATIONSHIPS THAT DESERVE MENTION

The preceding has been primarily about model definition, theory and analysis and survey methodology. Still there has been some mention of normative concerns and allocation. It is the perspective, introduced in a number of places in this volume, that it is consistent to maintain that allocation evaluation models need not be consistent with behaviour which results in the loose link between chapter 8 Technical Notes and other Notes. This is because one believes that the Technical Notes in these chapters either (1) allow one to see many problems to be solved to improve allocation and evaluation models based on behaviour or (2) forces one to recognize that researchers must do much work with policy makers, managers and planners to define objectives, to define goal-achievement standards and to define acceptable ways of assessing what should be in terms of policy and political perspectives. Specifically some researchers believe that the "pressures" computed in Technical Notes such as in TN 5 and 17 should reflect real pressures felt by people. Some believe consumer surplus as measured in TN 31 and 38 is "real" measure comparable with real dollars and produces a measure of people's relationships to resources. If people don't feel deprived or are not willing to pay the price consumer surplus suggests policy action will still be taken because the models are accepted and used.

Similar concerns with the relation of models to behaviour modelling is also clearly of major concern in TN 23, 25 and 26.

In TN 41 there is a dichotomy. This is expressed in the question: Was the kind of research done a good use of resources at the time or should the policy issues have been clarified to indicate if any empirical research should even be done. Similarly TN 40 raises questions about the relevance of the economic impact study approach discussed in TN 39 and elaborated on in this other note (TN 40). Can policy be empirically derived is the critical question that underlies different ways of viewing the notes in Chapter 8 in relation to other notes. A methodological question that raises issues about modelling and policy is whether models derived on data when one policy is in effect are even relevant in predicting behaviour under a quite different policy. The pessimist will see behaviour based models as primarily relevant to planning based on the status quo.

CONCLUSION

This article has documented the progress of the Canadian Outdoor Recreation Demands Study and a unity in it, at least in terms of progressing toward a goal of being able to predict people's behaviour and to relate it to policy oriented models. However, it is fair to say that the interrelationships that should be considered in predicting recreation behaviour are frighteningly complex. In this regard the model implicit in the "generalized framework" for modelling which has been described is not a model which is going to be calibrated in the foreseeable future or even totally defined in the foreseeable future. It is only a model which serves as a guide to thinking.

From a broad perspective it must be admitted that the rather substantial results reviewed in this chapter when considered in perspective do not really show that much progress has been made in modelling or understanding people's participation in outdoor activities. This chapter has concentrated on models which are good for "main° destination" "fairly single purpose trips". What part of recreation trips fall into this category. What planning or management needs for information can be met by such models. Then there is the effect of substitution, there are problems of defining user types for which various models are useful etc. etc. And, always, there is the lingering doubt where the balance should be between using "quick end dirty" methods with "due consideration" of what can be achieved, by advertising that is sometimes needed and Justified in dealing with the planning and management problems on which researchers work but which wilt never develop if each or most research projects do not contribute to a growing knowledge.

But even if research methods do develop, possibly the most important concern must be with how research on behaviour should relate to policy evaluation and the development of policy. This is a problem area as indicated in Chapter 8 and it is barely explored in this paper or in this volume* The critical consideration is raised in Volume I and that is that researchers must not be technicians but interact with planners and managers to develop en understanding of policies and policy problems so that they say make their proper contribution of indicating whore and how research can be used and discourage its misuse.