
**Jog Your Right Brain (JOG):
a case study in knowledge elicitation and evaluation**

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ABSTRACT

During the process of system dynamics modelling of organizations, plans, policies or problems, R-Mode (so-called "right-brained") procedures, such as the JOG exercise, seem especially relevant (1) in the early phases, when an elicitation of ideas, variables, considerations and concepts having possible relevance is undertaken, and (2) during any of the modelling phases, when an unbiased evaluation is desired, perhaps in addition to more traditional "objective" L-Mode assessments. JOG is described, as it was employed with top and middle managers of a small US hotel chain, in developing a preliminary system dynamics model for a new corporate vision.

THE PROBLEM

This paper addresses two issues. The first is to relate the characteristics of R-Mode techniques ("right-brained"), to the system dynamic model-building process. Although both hemispheres of the brain are actively involved in all normal mentation, the "right-brain revolution" has rekindled interest in often neglected human skills such as visualization, creativity, lateral thinking, relaxation, intuition, analogy, super-learning... A comprehensive literature is available, such as is discussed in the research review by Springer and Deutsch (1985) and the teaching review by Williams (1983). The second issue is to illustrate the use of the Jog Your Right Brain exercise (JOG) in an organizational setting. It is presented as a case study showing how JOG's R-Mode features elicited information and evaluations relevant to the organization's efforts at increasing sales revenues.

Systems dynamics modelers are developing increasingly sophisticated understandings of the *process* of successful model-building. The kinds of mental, information processing and expressive tasks required of lay systems member-experts, and of the modeler-facilitator-analysts themselves, varies widely among the stages of model-building. For example, Richardson and Pugh (1981) identify seven stages: problem identification and definition, system conceptualization, model formulation, analysis of model behavior, model evaluation, policy analysis and model use or implementation.

In considering the psychological literature on cognitive tasks relevant to model-building, Richardson et al. (1989) carefully distinguish between eliciting information, exploring courses of action and evaluating situations. *Elicitation* is divergent, creative, evocative and generative; it develops and identifies the ideas, concepts, variables, qualities, objects and relationships which may be relevant to a model-building endeavor. Elicitation seems closely akin to what are commonly referred to as R-Mode processes. They seem particularly relevant in two of the earlier stages of model-building (problem identification and definition, model formulation). Elicitation may also be useful in "the model evaluation phase where the group is brainstorming how to design or evaluate a model's performance". *Exploring*, on the other hand, is convergent, rule driven, procedural, systematic, and analytic; its purpose is to arrive at solutions to well defined problems, such as "specifying the feedback paths to be included within a model or devising a specific rate formulation". Exploring seems more akin to



L-Mode or "left-brained" mental processes, which are analytic, convergent, sequential, often quantified and verbal. Exploring is clearly relevant in the system conceptualization and model formulation stages, and most likely in later stages as well. *Evaluation* involves making assessments and judgments along dimensions or scales at one or more times, as well as selecting, deciding or choosing, expressing a preference, from the available alternatives. Effective evaluation is usually thought of as being objective, i.e. L-Mode. But, even in formal situations, evaluation is often rooted in or accompanied by substantial subjectivity and intuition, i.e. R-Mode. Evaluation is heavily involved in all the stages of model-building, including "tasks such as selecting parameters, assessing the validity of model output, assessing the performance of various policies, choosing between alternative structural formulations, or choosing which policies to investigate within the context of model simulations". Phrases within quotes above are from Richardson et al. (1989, 346-347).

In this paper's case study, we discuss the JOG exercise in connection with certain R-Mode aspects of *elicitation* and *evaluation*. JOG employs high quanta of R-Mode nonverbal, visual ambiguity. This is accomplished through the use of abstract pictures, created by the presenters. The pictures are associated with the current and potential future operations of the organization under study, as well as with the participants themselves, through the Projective Differential (PD) forced-choice technique (Raynolds 1969; Sakamoto 1980; Raynolds, Sakamoto & Saxe 1981; Raynolds, Sakamoto & Raynolds 1988). The technique produces a nonverbal representation of the organization, in terms of the abstracts. For *elicitation*, the pictures become springboards for open-ended verbal associations relating to the organization. Since the abstracts are richly evocative, they provide a means for participants to capture deep, sometimes subliminal and ineffable appreciations and insights into the organization, which can then be articulated verbally. Concurrently, JOG provides for several kinds of *evaluation*, through various tallies of the nonverbal PD choices: (1) an attitude (favorable-unfavorable) scale has been employed in assessment at a single or multiple moments in time and also in predicting voting and brand choice intentions. Being nonverbal, these evaluations avoid possible verbal response biases related to an individual's needs for cognitive consistency with positions taken on an issue in the past, pressures toward complying with real or imagined wishes of the administrator, tendencies to limit responses to what is thought to be socially desirable and protection of perceived self interest. They also provide holistic assessments, which reflect what is individually salient rather than what is important along preconceived dimensions created by the administrator. (2) an identification scale relates to the degree of individual involvement with, and commitment to, the topic under study; this should also be an indicator of the implementability of a plan or policy. (3) a measure of the degree of consensus in PD choices is an indicator of the degree to which participants share a mental mapping of the topics under study.

An overview of the exercise's use in this case study is now explained, with an emphasis upon *elicitation* and *evaluation*. More detailed descriptions of JOG and its roots in the PD methodology are given in Raynolds & Raynolds (1989a) and Raynolds & Raynolds (1989b). The way in which JOG contributed toward problem definition and to system formulation is outlined, along with the JOG scores demonstrating that the problem was indeed a serious one, beyond the scope of the initial problem definition. The preliminary system dynamic model of a new management "vision" presented to top management is shown, and the events which followed are described.

CASE STUDY

The client organization, which we shall call USH, is a small hotel chain which owns and operates properties in a major US metropolitan area. In late 1989, USH was experiencing the hotel industry's generally increasing competitiveness and high turnover of personnel. At the time of our contact, a major renovation of its flagship hotel had just been completed. The refurbishing of rooms, lobby, bar and dining/conference rooms was implemented with a central theme throughout the hotel. The atmosphere was that of a small, gracious and hospitable european all-suite hotel. The marketing concept was to specialize in highly personalized service and to provide guests with a "retreat" from the hustle and bustle of a large city. The corporate strategic plan was to upgrade its other properties and, ultimately, to add new ones.



We were asked by the director of human resources to conduct a program which would involve key managers from headquarters and from all of their properties. It was to be focussed upon the development of creative new ideas for "selling the hotels" in order to reach new, higher revenue objectives. Three separate two hour JOG sessions were conducted. Two were with different sets of middle managers, including department heads and staff from headquarters as well as resident managers and department heads from individual properties. One JOG session was with top management, consisting of the president and vice president. Results from the JOG sessions supplemented by extensive one-on-one discussions, led us to the conclusion that the path to higher sales required addressing the functioning of the system as a whole, and this required the development of a new strategic management vision.

JOG sessions with middle managers

Seven participants attended the first, and ten attended the second JOG session. Participants were from a wide variety of operational areas including sales, house keeping, accounting, human resources... After discussing the purpose of the session, the nature of "R-Mode" creative processes and the JOG exercise itself, we devised the two JOG working topics: CURRENT OPERATIONS and POTENTIAL OPERATIONS, the latter meaning "the best that our operations can become (realistically)". The topics were designed to *elicit* information about the context within which the matter of attaining sales objectives as well as projectively rooted perceptions and opinions about what was realistically attainable. JOG simultaneously generates evaluative information about the topics.

The first phase of JOG involves individual data gathering. This begins with obtaining PD (projective-differential) choices from pairings of abstract visual pictures. All of the combinations of five different pictures are shown for each of the topics. Each of the five pictures is shown in combination with the four others. Consequently, there is a total of ten pairings for each topic. In these sessions, two of the topics were working topics (mentioned above) and two topics were anchor topics, i.e. MYSELF (THE WAY I REALLY AM) and THE PICTURE I PREFER (OR LIKE BETTER). This step takes about four minutes, since the choices are made in less than a second, and only three seconds are needed for participants to indicate their choice on the pre-printed response form. Next, participants are asked to think about the working topics and to rate them on a scale of "0" to "10", with "0" indicating a totally negative attitude, "5" a neutral one and "10" a completely favorable attitude toward the topic. These are well considered "L-Mode" *evaluations*. In the last individual data gathering step, participants are shown each of the five pictures for about a minute apiece. The task is to write down an appropriate name for the picture, a brief description of it and/or what it looks like. A few minutes are allowed for neighbors to compare notes as to what names they gave the pictures. This always frees-up the working atmosphere, breaking down barriers to later open discussion. In all, the individual data gathering takes less than 15 minutes.

The second JOG phase consists of individual scoring and interpretation of results. First, the participants tally the number of times they made the same choices for pairs of topics. Starting with topics I and II, then proceeding to all of the remaining five pairs of topics, with III and IV being last. Participants then tally their choices of each of the five pictures for each of the topics, thus permitting them to determine which of the pictures seemed most like each of the topics. We refer to these pictures as the ones "epitomizing" the topics. The individual work of the session is concluded with an interpretation of the scores and some connecting of the individual data with the working topics. We derive individual R-Mode attitude measures of the working topics by looking at the same choice scores between them and the anchor topic THE PICTURE I PREFER (OR LIKE BETTER). Scores under "5" suggest negative attitudes, since the picture choices for working topics are more UNlike than like the choices for the preferred picture. Conversely, scores over "5" suggest positive attitudes. Similarly, we derive individual R-Mode identification scores with respect to the working topics, by looking at the same choice scores between them and the anchor topic MYSELF.

These attitude and identification measures, are presented to participants as soft hypotheses to be tested through personal reflection and additionally by the last two interpretive steps. First, the R-Mode attitudes are compared with the L-Mode attitudes acquired immediately after the first individual data



gathering step. We mention that differences of a couple of points or more suggest that what the L-Mode is saying is different than what the R-Mode is feeling about the working topics, especially if the two scores are on opposite sides of the neutral "5". This opens up the legitimacy of mentioning feelings about the working topics in the remainder of the session. Lastly, the original attitude and identification *evaluations* are checked by looking at the names given epitomizing pictures for the working topics. This always produces a buzz of aha's, smiles, nods of agreement and sometimes looks of puzzlement. Participants are asked to think about how it is that their epitomizing pictures are like the working topics. This is the raw material for the group phase of the session. The scoring and interpretation phase of the JOG exercise takes about 20 minutes. Tables 1 and 2 summarize these scores.

Score ¹	R-Mode	L-Mode	INcon- gruence	Interpretation
Attitudes toward:				
CURRENT OPERATIONS	5.29	5.66*	(0.37)	Lukewarm & Congruent
POTENTIAL OPERATIONS	7.41**	8.35	(0.94)*	Positive, slight Incongruence
Difference (Room for improvement)	(2.12)**	(2.69)**		Very large
Identification with:				
CURRENT OPERATIONS	4.59	na		Slightly negative
POTENTIAL OPERATIONS	6.65**	na		Positive
Difference (Room for improvement)	(2.06)**			Very large
Similarity between CURRENT and POTENTIAL OPERATIONS	4.53	na		Slightly DISsimilar

¹ Scores (ATTITUDE, IDENTIFICATION and SIMILARITY) are based on a scale of 0 to 10: Under "5" is negative, "5" is neutral, and over "5" is positive. Differences between scores are indicated by parentheses (). * p < .05 ** p < .01

Table 1 displays *evaluative* attitude and identification scores. R-Mode attitudes toward CURRENT OPERATIONS were luke warm (5.29 on a 10 point scale), which was confirmed by the L-Mode scores (5.66). Experience has shown that such low scores are a warning. R-Mode identification was slightly negative (4.59), indicating that middle managers were not committed to CURRENT OPERATIONS. On the other hand, POTENTIAL OPERATIONS received favorable R-Mode attitude (7.41) and identification (6.65). L-Mode attitude scores confirmed the R-Mode scores (8.35), although somewhat exaggeratedly, as indicated by the incongruity measure. Noteworthy is that there was a slight DISsimilarity between CURRENT and POTENTIAL OPERATIONS (4.53), confirming that much room for realistic improvement was perceived.

Table 2 is a bridge to the *elicitation* of information about the organization, it summarizes the percentage of the possible PD choices each of the five JOG pictures received on the two working topics. Middle managers chose picture "C" as being most like CURRENT OPERATIONS (62%) and also least like POTENTIAL OPERATIONS (15%); the difference (47%) was significant at the .01 level. The two other JOG pictures producing large differences were pictures "A" and "E", which also most epitomized POTENTIAL OPERATIONS (68% and 78% respectively).

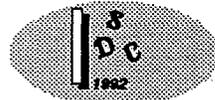


Table 2 Middle managers' choices of JOG pictures (percent of possible choices).

JOG Picture	CURRENT OPERATIONS	POTENTIAL OPERATIONS	(Difference)	Interpretation: there is currently -
"A"	40*(Low)	65**(High)	(+25)*	Much Too Little ¹
"B"	40*(Low)	51	(+11)*	Somewhat Too Little
"C"	62*(High)	15**(Low)	(-47)**	MUCH Too Much ¹
"D"	57	41*(Low)	(-16)*	Somewhat Too Much
"E"	51	78**(High)	(+27)**	Much Too Little ¹

¹ These three JOG pictures are the epitomizing ones. * p < .05 ** p < .01

Table 3 Middle managers' names of the three JOG pictures epitomizing CURRENT and POTENTIAL OPERATIONS (a partial listing)

Picture "A"	Picture "E"	Picture "C"
(Currently there is Too Little - more is desired of these kinds of qualities)		(Currently there is too Much - Less is desired of these kinds of qualities)
Peace Unveiling	Amor	Swamp
Breezy fall day	Progressive Businessman	Possessed, scary, mean
Wings emerging	Happy, positive, warm	Rigid - unyielding
Jesus in an Aura	Serene water, safe hands	Bull
Cocoon	wrapping around	Chaos
Colorful, symmetrical, transformational	Butterfly	Going in various directions
Cheery, cohesive	Paradise	Desert scorpions
Controlled whirlwind	Scattered variety	Desert creature
Seasons	Similar minds meeting	Intensity (warmth in the middle of the desert)
Powerful/holy	Restful	Looks evil
Butterfly	Cool reactions	Pond life, having to make choices
	Openness, friendly calm	Island & lava (fiery)
	Marriage & happiness	Submarine, bottom of the sea
		Sea Urchin
		Toxic Waste

The group phase of the JOG exercise began by collecting names given to epitomizing JOG pictures. Table 3 provides a partial listing of the names participants gave the epitomizing pictures for CURRENT (picture "C") and POTENTIAL OPERATIONS (pictures "A" and "E"). The data in these displays are composites from the two JOG sessions with middle managers. The names were put on flip charts for reference during group discussion. The lists which emerged indicated that current operations were associated with pictures which evoked predominantly negative, aggressive and uncoordinated concepts, while potential operations shifted toward far more positive, harmonious and coordinated concepts. This qualitative assessment is consistent with the quantitative *evaluative* information Table 1 displayed earlier.



The group developed a list of features of the problems which were blocking the desired sales objectives and then a list of the actions they could take to assist the movement from current to potential operations. Table 4 summarizes these ideas. There was wide recognition that sales plans involving cooperation among departments would not succeed until the organization became a cohesive, unified whole. Currently, the departments were locked in destructive competition for praise and perks from top management, which seemed to be scrutinizing all activities closely. Involvement by top management in day-to-day activities of the organization at any level was seen to be a confusing factor, one which inhibited the learning of responsibility for overall performance of the hotels. There was a desire for more delegated authority from above, and to delegate more authority downward, as well. Taken together, these ideas were incorporated in the concept "quality of the working climate".

Table 4 Middle managers' ideas *elicited* from group discussions at the end of the JOG sessions

Problems: what's blocking our effectiveness-

- * We are too structured and rigidly split into separate, destructively competitive and conflicting parts. * Departments and individuals are vying for praise from top management.
- * There is too much negativity and sarcasm, insensitivity, lack of mutual caring. * Some of us feel that things will not ever get better - change is impossible - there is no point in trying - we always end-up back on "square one". * We feel like puppets, watched and controlled by mysterious forces.

Solutions: actions we could take-

We should try to become one whole (not separate parts) with a bit of structure (but not so much as we have now). * We need more teamwork, more pulling together (so as to become less split apart than we are now) in reaching common objectives. * We should become more smooth and flowing, also softer, more positive, sunshiny, cheery and cohesive with one another. * We should curb our negativity, sarcasm and feelings of futility. * We should show more mutual respect for one another (e.g. be prepared and on-time for meetings, listen better, not blame one another...). * We should keep "cool" and not panic so often. * We should ask our superiors for and learn to give our subordinates more delegated (real) authority. * We should be less "Puppet-like", taking more responsibility for our own actions, and take more initiative for moving toward our individual and organizational potential.

While we were concerned that some middle managers had expressed skepticism about major changes actually being realizable (e.g. "always back to square one" from one and a "no comment" from another), the majority expressed enthusiasm and thought they could take-on responsibility themselves for substantial movement from current to considerably higher levels of future operations. They seemed to realize that they were unnecessarily making things difficult and unpleasant for one another. We were confident that the ideas about how to proceed were soundly grounded in shared perceptions, buttressed by emotional commitment. Means for facilitating many of the solutions were readily available from management, group and/or organizational training and consultancy resources in the area, if top management would support these efforts.

JOG session with top management

A JOG session with the president and vice president was held two days after the first middle management sessions. The same JOG format was employed, using the same working and anchor topics and the same abstract pictures. After the scores were tallied and interpreted, we entered the discussion phase during which we also shared some of the results from the sessions with middle managers. By this time, top management was aware that there had been widely positive reactions to the initial JOG sessions by middle management participants.

The president's *evaluative* JOG scores were similar to middle management's (as shown in table 1). He too, felt there was room for improvement. Attitude toward CURRENT OPERATIONS was "6",



and POTENTIAL was "8"; and identification with CURRENT OPERATIONS was "5", and POTENTIAL OPERATIONS was "7". These latter scores were discussed. The president felt that greater involvement on his part would contribute to improved results. He was the son of the owner and had worked his way through all of the basic positions, including being head of housekeeping. He knew intimate details of all operations, whereas most of the college graduates he had hired did not. In his view, middle managers and staff were immature and needed to take more responsibility, such as a bellman not picking up litter or asking if he could help a guest waiting at an unattended main desk. He tried to nudge them in this direction whenever he could. This orientation by the president was opposite to the middle managers' desire for more autonomy. Even though he acknowledged that he was relatively unskilled at it, he ignored several suggestions about learning the art of greater delegation. This avoidance may have been partially motivated by perhaps feeling vulnerable if less involved with day to day operations at the properties. His father had been actively involved in operations until recently, but was currently ill and in the hospital. Nevertheless, we thought the president's interest in tackling the larger top management issues of overall organizational functioning, further upgrades and expansion, might be kindled if he were more confident in the potential capabilities of his staff. In contrast, the vice president's attitude and identification data showed no R-Mode difference between CURRENT and POTENTIAL OPERATIONS, all four scores were "8's". The L-Mode attitude rating of CURRENT OPERATIONS was slightly lower than the POTENTIAL at "9" versus a "10". There was little evidence of an impetus for major change from the vice president. She had designed and implemented much of the flagship hotel's new renovation, decor, staffing and operations, including the marketing and service concepts. She and the president considered the staff to be "family".

Referring back to Table 2, there was a complete reversal in some crucial choices between the president and the middle managers: Picture "C" epitomized CURRENT OPERATIONS for middle managers while picture "E" epitomized their POTENTIAL. The reverse was true for the president. The president saw CURRENT OPERATIONS as being most like picture "E", which he named "clouds with Darth Vader in middle", and POTENTIAL as most like picture "C", which he named "Red frog in the weeds". Thus, while manifestly seeking an improvement in operations, the president and middle management were seeing CURRENT and POTENTIAL OPERATIONS quite differently on latent, projective levels. Incidentally, the vice president's name for picture "E" was "noncommittal, shallow, no depth".

Further analyses, development of a strategic management vision and subsequent events

One of the important *evaluative* indices which can be derived from any JOG exercise is a measure of the degree of nonverbal consensus among participants for each of the four topics employed. We believe this may be a nonverbally based indicator of shared mental maps, as sought by Vennix and Scheper (1990) and Scheper (1991). This measure is the sum of the Chi-Squares across the choices made on a given topic's ten JOG pairings. The degree to which participants agreed in their choices on each JOG pairing contributes to the overall consensus measure, which encompasses all ten pairings for a topic. In this study, the middle managers showed a significant sharing of nonverbal perceptions for all four topics, see Table 5. CURRENT OPERATIONS had the lowest ($p < .05$), and POTENTIAL OPERATIONS the highest ($p < .001$). These results are consistent with our earlier qualitative impressions that CURRENT OPERATIONS were relatively conflicted and confusing to the middle managers, and that their readiness to undertake a definition of POTENTIAL OPERATIONS and how to reach them, was solidly grounded in highly shared perceptions and emotional commitments.

CURRENT OPERATIONS	16 (.05)*	MYSELF	28 (.005)
POTENTIAL OPERATIONS ...	60 (.001)	THE PICTURE I PREFER ...	58 (.001)

* Chi-Square (significance), one-sample test, versus random expectations, df=10.

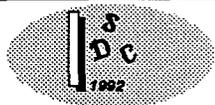
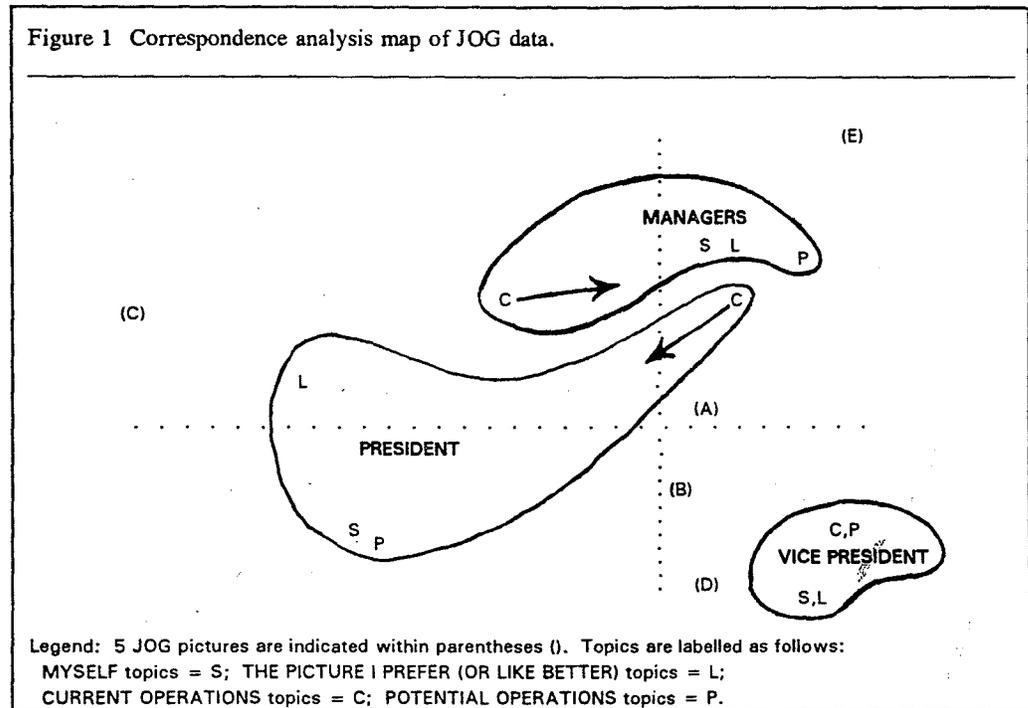
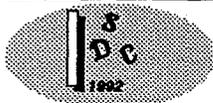


Figure 1 Correspondence analysis map of JOG data.



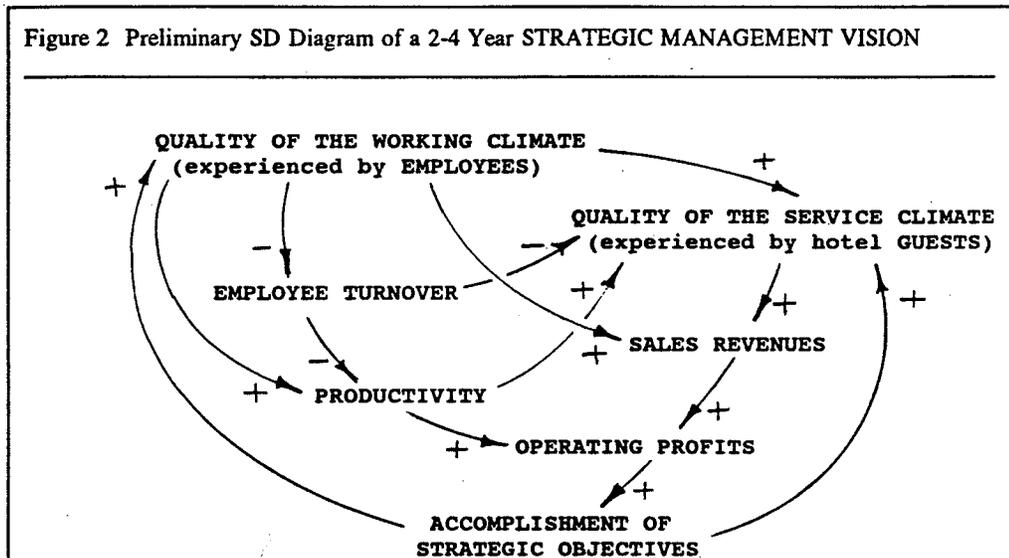
The JOG R-Mode data were also subjected to a CORANA correspondence analysis (Saxe, 1991; Lebart et al. 1984), to chart the relationships among JOG pictures and topics for all respondents. Figure 1 displays the results. Choices by the president, vice president and middle managers are weighted equally, and the locations of their perceptions of the four topics are shown relative to the five JOG pictures. The arrows indicate the president's and the middle managers' perceptions of the direction to proceed in moving from CURRENT OPERATIONS toward POTENTIAL OPERATIONS. Note the essentially opposite directions. The vice president's perception of CURRENT and POTENTIAL OPERATIONS are plotted at exactly the same point. Thus, the middle managers' skepticism about the possibilities of there being real change in the directions they desired may be explained by their conscious or unconscious awareness that the president was pushing in an opposing direction, and that the vice president was satisfied with the current state of affairs. The president's ideas about greater involvement had to do with day to day detailed affairs, rather than the larger, strategic management issues. The middle managers would loose desired autonomy in that process. Note also that the distances between self and CURRENT versus POTENTIAL OPERATIONS indicate greater closeness (identification, involvement) with POTENTIAL OPERATIONS for both the president and the middle managers. This was an inherently contradictory, conflicting state of affairs. The vice president was identically and the most closely identified with both CURRENT and POTENTIAL OPERATIONS.

The director of human resources reported to top management that the JOG sessions had been fruitful and were well received by the middle managers. His comments were combined with our observations in developing a broader approach to the initial problem of creatively enhancing sales efforts. No sales program would be likely to succeed unless larger organizational issues were addressed by both top and middle management. The obstacles middle management identified (see table 4) could be more readily overcome if top management were to invest and have confidence in developing a more effective and cohesive staff. The JOG sessions strongly indicated that the personnel on hand warranted this trust. Middle managers of USH were a young (average age 29) and potentially enthusiastic learning



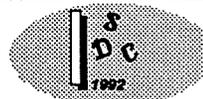
organization that could achieve greatly enhanced operating results. They had to believe they had a place for career development at USH and all would gain from the success of the whole organization in the long run.

Figure 2 Preliminary SD Diagram of a 2-4 Year STRATEGIC MANAGEMENT VISION



The above ideas were combined under the heading of improved "quality of the working climate", which includes, but goes beyond matters of pay and benefits. It is at the top of the preliminary systems diagram of a new strategic management vision which was submitted to top management, see Figure 2. Flowing from quality of the working climate is the important result of reduced turnover. The high turnover militates against USH's success. The marketing concept required a well trained staff, one having continuity through time. Top management's investments in its people would produce an improved proficiency, cooperation and coordination among departments. Improved quality of service to guests would be a direct result. Guests would return more frequently and provide more referrals. These factors would lead to the originally sought-after increased sales revenues. Productivity would be improved through actively pursuing more efficient operations carried out by a better trained, more motivated staff. There would be less wasted effort and materials, and less pilferage as well. The impact of higher productivity and higher sales revenues lead directly to improved operating profits, some of which could support the strategic objectives of continued upgrading of other properties and, also, the further investment in management and staff. The organization could accelerate its growth, thus providing more attractive career opportunities for employees. Together, this would further improve the quality of the working climate and the corresponding benefits diagrammed would continue to accrue. This vision was presented as a preliminary one. The principal stakeholders (owners, top management, middle management and staff) would have to arrive at their own, refined vision, for real change to be implemented. Our estimate was that the transformation of USH could be well established in 2-4 years.

In the next nine months, the president chose not to pursue the direction proposed in the vision. The vice president was transferred to a different portion of the family's business. The president's son, who had been working in another hotel chain, assumed the vice president's position. The president's father returned from the hospital and assumed limited activities with the organization. The director of human resources and several other key managers left the organization. The president said that sales had improved and that expenses had declined. Some middle managers reported that the quality of the working climate had deteriorated.



SUMMARY

The roles of *elicitation* and *evaluation* in the various stages of system dynamics modelling was discussed in the context of R-Mode and L-Mode mental processes. By surfacing underlying problems not readily accessible through L-Mode elicitation and evaluation techniques, the use of the JOG exercise in an organizational setting shifted the focus of inquiry from improving sales to improving the organization. JOG results made it clear that the organization's existing top and middle managements were unlikely to make progress, because they were not sharing sufficiently unified mental maps of the current nor desired situation. This led to the creation of a preliminary system dynamic model of a strategic vision which could make progress possible. Top management chose not to consider the model seriously. This was followed by rapid changes in key management personnel.

REFERENCES

- Lebart, L., A. Morineau, & K. M. Warwick. 1984. *Multivariate Descriptive Statistical Analysis: Correspondence Analysis and Related Techniques for Large Matrices*. New York: John Wiley & Sons.
- Raynolds, P. A. 1969. The projective-differential: a general purpose inkblot technique for studying denotable objects. Ph.D. Dissertation, University of California, Los Angeles. *Dissertation Abstracts International*, 1970, 31, 512A.
- Raynolds, P. A., G. H. Raynolds. 1989a. Jog Your Right Brain: fun in the classroom (and research too!). *Organizational Behavior Teaching Review* 13 (1): 7-22.
- Raynolds, P. A. & G. H. Raynolds. 1989b. The 'Jog Your Right Brain Exercise' at ISAGA'88. In: J. H. G. Klabbers, W. J. Scheper, C. A. T. Takenberg, D. Crookall (eds.), *Simulation-Gaming: On the Improvement of Competence in Dealing with Complexity, Uncertainty and Value Conflicts*, Proceedings of the International Simulation and Gaming Association's 19th International Conference, Utrecht University, The Netherlands, 16-19 August, 1988. Oxford: Pergamon Press, 260-268.
- Raynolds, P. A., S. Sakamoto & G. H. Raynolds. 1988. Consistent Projective Differential Responses by American and Japanese College Students. *Perceptual and Motor Skills* 66, 395-402.
- Raynolds, P. A., S. Sakamoto & R. Saxe. 1981. Consistent responses by groups of subjects to projective differential items. *Perceptual and Motor Skills* 53, 635-644.
- Richardson, G. P. & A. L. Pugh. 1981. *Introduction to system dynamics modeling with DYNAMO*. Cambridge, MA: The MIT Press.
- Richardson, G. P., J. A. M. Vennix, D. F. Andersen, J. Rohrbaugh, W. A. Wallace. 1989. Eliciting Group Knowledge for Model-Building. In *Proceedings of the 1989 International Systems Dynamics Conference*, Stuttgart, 341-357.
- Sakamoto, S. 1980. Contingency severity and individual performance in a probabilistic game setting. *Human Relations*, 33(10), 687-709
- Saxe, R. 1991. *CORANA: Correspondence Analysis*. La Canada, CA: Saxe Research.
- Scheper, W. J. 1991. *Group decision support systems: an inquiry into theoretical and philosophical issues*. Ph.D. Dissertation, Utrecht University, The Netherlands.
- Springer, S. P., & G. Deutsch. 1985. *Left brain, right brain*, rev. ed. San Francisco: W. H. Freeman & Co.
- Vennix, J. A. M., & W. J. Scheper. 1990. *Modelling as organizational learning: an empirical perspective*. Paper presented at the International System Dynamics Conference, Boston, July 10-13, 1990.
- Williams, L. V. 1983. *Teaching for the two-sided mind*. Englewood Cliffs, NJ: Prentice Hall.

