BEHAVIORAL TEAM-BUILDING IN A THIRD-WORLD STEELWORKS: EFFICIENCY AND ETHICS

Carlos Pittaluga and Sherman D. Roberts
Universidad Simón Bolívar, Caracas, Venezuela

Abstract

The following article is a progress report and behavioral analysis of progress. The progress reported and analyzed is the collective achievement of an interdisciplinary team of professors and students of the Universidad Simón Bolívar and teams of workers, technicians and engineers employed by the SIDOR Steelworks. If credit is to be given for this progress, it belongs to all of the individuals involved. The authors' task here is primarily to report and interpret the project and its results using the proper behavioral vocabulary.

This paper describes and analyzes the initial and current phases of a project involving the use of behavioral technology in a large "Third-World" Steelworks (Venezuela's "Siderúrgica del Orinoco" or "SIDOR") by a group of professors and students from the Universidad Simón Bolívar's Independent Studies Program ("Estudios Libres") and by SIDOR teams that were trained by the aforementioned group. The authors believe that the results outlined have important implications that should be taken into consideration by those interested or involved in industrial behavior modification in general and especially by those individuals who are interested or involved in behavior modification in the so-called "developing areas" of the world.

The term "team-building" is broadly applied to any systematic effort designed to promote cooperative, task-oriented, productive behavior through the use of "psychological techniques". The term is frequently applied to specific group dynamics technologies that supposedly work by "eliminating interpersonal tensions", "allowing people to relate to one another", or "promoting the capacity to externalize controversial opinions or to give and receive meaningful feedback".

A major assumption of this article is that regardless of how its means and effects are conceptualized, if a team-building effort works, it works because it makes use of certain behavioral principles. Team-building takes place in a group setting and is guided by one or more trained individuals who, through their verbalizations, gestures and other behaviors, provide discriminative stimuli, feedback, positive reinforcement, and "modeling cues" for participants. Rules are often established which act as discriminative stimuli for behaviors of certain classes. Participants thus learn the desired behaviors in a short time and the social reinforcement process becomes more effective. Those who monitor the process also provide discriminative stimuli and "negative reinforcement" by pointing out potentially aversive aspects of participant verbalization, and by restating the feedback such that these aspects are no longer present. Rules may also be made explicit here. The analysis of specific practical problems is part of most team-building efforts and, in addition to the aforementioned behavior modification elements that also operate in such analyses, there is also the "teaching machine effect": the conditioned reinforcing effect of a satisfactory answer. Team-building efforts that have been specifically designed to exploit such principles may be called "behavioral team-building efforts".

Our team-building efforts in the SIDOR steelworks were and are decidedly behavioral; and they were and are highly successful in the sense that defines success in team-building: the promotion of cooperative, task-oriented, *productive* behavior on the part of employees. Nevertheless, the initial project with a production line in the Flat Rolled Products Plant produced results that seem paradoxical to the layman: the very success of our behavioral team-building efforts contributed to managerial animosity and aggressive measures directed toward the Universidad Simón Bolívar (USB) and SIDOR teams that carried out the training and supervision. These apparently paradoxical results yield to an adequate analysis based on behavior modification principles, and in consequence it has been possible to revise our strategy and provide solutions that are ethically and economically acceptable with regard to the interests of employees as well as management.

The results reported herein invite comparisons with those of a famous project carried out in an air freight company and reported in the film "Business, Behaviorism and the Bottom Line" (1972). The core of our program — the on-the-job use of feedback and positive social reinforcement — is the same as that of the air freight company program, although, due to the circumstances that exist in SIDOR, we have had to include other techniques some of which have not been extensively analyzed in terms of behavior modification principles. Of greater importance is the fact that the program reported in "Business, Behaviorism and the Bottom Line" and most other industrial behavior modification efforts that have been carried out in the United States and in other so-called "developed countries", have proven successful in environments that are quite sedate and serene in comparison to the SIDOR installation. Third-world industrial environments like SIDOR may be construed as one of the acid tests for industrial behavior modification technology.

This claim cannot be substantiated, nor can the results even be fully understood independently of an understanding of the "contextual variables" that operate in the SIDOR environment. To this context of accelerated, and to a great extent, forced industrial development we now turn.

SIDOR and its Economic, Political and Social Context

The SIDOR plant is located in Bolívar State, Venezuela near Puerto Ordaz on the triangle of the land that separates the Orinoco River from its tributary, the Caroní. The original plant was finished in 1963. In 1964 SIDOR was formally established as a subsidiary of the government-owned Venezuelan Guayana

Corporation ("Corporación Venezolana de Guayana"). Between that year and the end of 1967 SIDOR produced net losses. In 1968 SIDOR's management took several steps, including signing contracts with foreign consultants, diversification of production lines, and industrial engineering and maintenance projects, that resulted in net gains of 3.6 million dollars. By 1972 SIDOR had become the largest employer in the area, was making considerable profits and was handling all of Venezuela's steel commercialization operations. During that same year its rate of personnel turnover was a modest 4%.

Ironically, a "positive" change in Venezuela's economic situation put SIDOR in trouble again. In 1973 oil prices increased fourfold and to capitalize upon this increase in income, the following year the national executive approved a plan whereby enough money and other resources would be diverted to SIDOR to increase annual steel production to 4.8 million metric tons by the end of 1979. This plan, known as Plan IV, called for 12,133 new employees. Some 30% of the new employees hired between 1974 and the end of 1977 were newly arrived foreign technicians.

The execution of Plan IV has been plagued with many difficulties, most of which can be attributed to underestimations of the problems involving human resources, and to mismanagement of attempts to solve such problems. From the 4% rate in 1972 personnel turnover (resignations, terminations, etc.) rose to 26% by the beginning of the period during which the Universidad Simón Bolívar (USB) advisory team carried out its initial work project (between October 1977 and May 1978[1]). The projection for personnel turnover is dramatic (see Figure 1). SIDOR is losing its experienced personnel. By 1977 with a 19.6% turnover rate, only 44% of SIDOR's employees had two years or more of experience in the plant (Guedez & Riebman, 1979). The fact that steel making requires skilled labor makes personnel turnover SIDOR's most pressing and difficult problem. SIDOR's economic losses which came to $617.4 million in 1977 (in relation to $531.6 million in sales) were and are largely due to personnel turnover and the problems that derive from it. Moreover, these losses must be seen in part in light of the fact that SIDOR must subsidize many Venezuelan industries by selling steel products below cost. No similar partial justification can be applied to the personnel turnover problem.

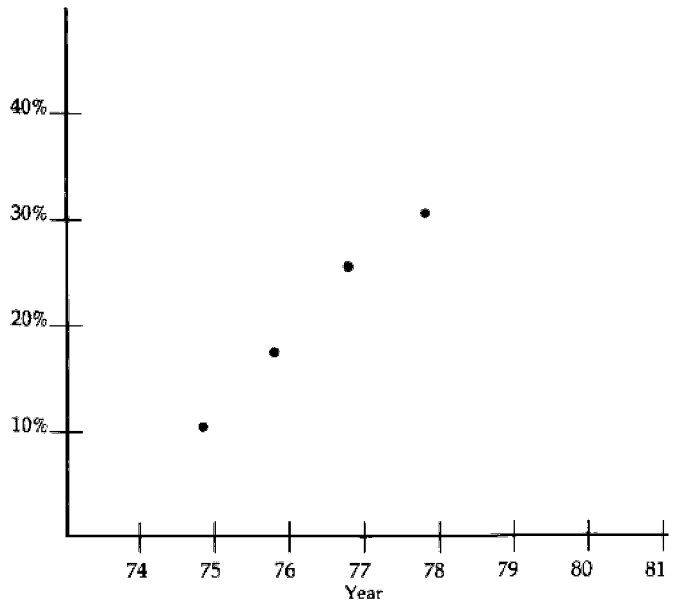

FIGURE 1
Projection of Personnel Turnover
(from Guedez and Riebman, 1979)

It will be shown that turnover is largely due to the restructuring process that has occurred as a result of Plan IV, but it should be helpful to consider more remote aspects related to personnel turnover before attempting to demonstrate this point.

It may be that industrial modernization is not inherently destabilizing; but where such efforts are accelerated and largely forced or pushed by the state, many possibilities for aversive stimuli arise. The Guayana area of Venezuela has historically been isolated, sparsely populated, traditional, and "underdeveloped". SIDOR, the Guri Dam project and other industrial and transportation projects have changed that situation drastically. The SIDOR area (Puerto Ordaz, San Félix, etc.) has thus come to suffer from "gold rush" social ills. Housing, medical care, educational services and recreation are scarce and costly. The crime rate is high. Individuals of eighty-six nationalities make up SIDOR's work force. Many of these people speak Spanish poorly, if at all, and national groups rarely mix socially. Political diversity is considerable among the Venezuelan work force (33 parties participated in the most recent national elections) and some extremist groups advocate and practice violence, though the percentage of SIDOR workers who support such groups is small.

SIDOR has responded to the negative aspects of the setting by adopting functions that, according to legal and or customary norms corresponded to the local government or other official organizations. Transportation outside the plant is deficient; thus SIDOR organizes bus services. Difficulties with handling injured workers have forced management to set up a "complete circuit service" (from the scene to the hospital and to the worker's home if necessary). Eighty percent of the housing problem for SIDOR's employee's (14,000 during the period of our initial project; 18,333 at the time of writing) have fallen upon the shoulders of management. The inadequacy of external medical facilities has forced SIDOR to set up routine or non-emergency services inside the installation. It appears that SIDOR will shortly be obliged to establish primary school facilities due to the fact that those made available by the local government are painfully inadequate. In short, SIDOR has become a state within a state. These measures, however, have not been sufficient to reverse the personnel turnover trend nor to resolve a great number of other problems related to "employee motivation".

What are the hierarchical relations among factors that contribute to the principal problem of personnel turnover? According to investigations carried out in SIDOR (Guedez & Riebman, 1979) the five most important factors, from most to least important, are: 1.) The aversive nature of working relations between superiors and subordinates; 2.) general working conditions; 3.) social services (education, health, etc.); 4.) other quality-of-life conditions in the surrounding environment (housing, food, recreation, etc.); and 5) wages. This study indicates that through its state-within-a-state policy SIDOR is attacking the fourth factor of importance responsible for personnel turnover. The fifth factor is also well taken care of by a pay scale that is among the best in the Guayana area of Venezuela. Complaints about pay are usually more easily understood in terms of the costs of many goods and services in the SIDOR area.

The second causal factor of personnel turnover, "general working conditions", can be analyzed further. Accidents and safety practices are an important component. In SIDOR an average of thirty-six accidents of varying degrees of seriousness occur daily (12 per shift). Accidents are less frequent, but rate of production is also lower, during day shifts when section heads and superintendents are in charge, than during night shifts when operations personnel (supervisors and shift bosses) are in charge. Accidents can be attributed to the dangers inherent in the steelmaking process in part; but the lack of adequate accident prevention education and certain conditions that disfavor the use of safety gear appear to explain the high rate. These latter conditions include the unavailability of lockers to keep the gear in; the fact that even if the worker has a locker he must put his gear on while it is still wet thereby risking tropical fungus infections; gear is often stolen from lockers; and dependence on public transportation makes taking safety gear home impracticable. Some workers sell their safety equipment hoping that it will be replaced; and this practice means higher costs for the company. Finally, many injuries are probably not "accidental" in a strict sense. Many workers exhibit a pattern of "machismo behavior" which consists of high-risk work responses resulting in burns, scars and the like. These behaviors are reinforced by social attention, approval and status.

Intra-plant transportation is another working condition component which causes turnover. Due to the size of the industrial installation, mechanized transportation is necessary to take employees to and from their work areas within the plant. These transportation facilities are scarce and this results in crowding and delay. This is one of the factors that produces a "people-waiting-for-people" phenomenon involving aversive social interactions.

Eating facilities are also badly overcrowded and the distance between these facilities and work areas is frequently too great to allow employees to arrive, eat and return in the half-hour allotted for lunch. This situation creates discomfort and, again, the "people-waiting-for-people" phenomenon arises.

The four factors in the causation of personnel turnover that have been mentioned have some obvious points of interaction with the most important factor: the aversive nature of working relations between superiors and subordinates. The aversive consequences of conditions inside and outside the industrial installation surely increase the probability of aggressive and frustrating interactions between superiors and subordinates, just as the heat, noise and danger of the steelmaking process itself must probabilize such behaviors. Nevertheless, there is considerable evidence to suggest that the aversive superior-subordinate relations that contribute heavily to turnover are in turn principally due, not to the aforementioned factors, but to personnel policy changes that have been made as part of the execution of Plan IV. These policies have frequently put highly experienced and competent subordinates in the hands of untried and undertrained superiors. Frustrating situations and delays have ensued and it is well-known that once aggressive behaviors occur they tend to produce a self-maintaining loop of punishment and aggressive behavior. SIDOR managers generally recognize that such loops exist and that they affect production directly, as well as through personnel turnover. One piece of evidence for this latter point was cited earlier: the higher levels of production occur when section heads and superintendents are *not* present.

In order to eliminate such loops those involved must stop punishing each other. It is neither surprising nor censurable that the SIDOR management accomplished little in this respect until the USB team began its work. Myths about free will, about the inherent resistance of "human nature" to direct change, etc., are only a little less prevalent (if at all) among managers than among the population in general. Many concepts of free will paradoxically permit one to believe in some forms of persuasion (e.g. ingratiation). Thus, as has been shown, SIDOR's management hoped to reduce turnover and increase production by attacking some conditions in the environment.

Given the multitude of problems that do not figure directly as causal factors of turnover, it is furthermore not surprising that the USB team was initially hired by SIDOR to deal with one of these lesser problems. *The Initial Project: Work with the Electrolytic Cleaning Production Line in the Flat Rolled Products Plant.*

The initiative that put personnel of the USB Independent Studies Program in contact with SIDOR was taken by a group of young engineers employed in the Flat Rolled Products Plant who considered that the problems of the aforementioned plant were of the same kinds as SIDOR's problems in general and wanted to do something about them.

After several meetings with SIDOR managers, the USB team designed, supervised and evaluated a training project for a group of twenty-four members of the Flat Rolled Products Plant's work force that was christened the "Human Resources Group". Neither the USB advisory team nor its SIDOR associates had analyzed the plant's problems in depth; and thus, the initial planning was strongly inclined to provide the kind of help that SIDOR specifically asked for: help with the problem of acquiring industrial technologies.

Happily, the days in which a Japanese, American or German technician would demand that all SIDOR employees leave the work area before repairing a piece of industrial equipment are gone. Even so, it is well-known that the technologies that firms in the "developed" world sell are partial technologies: the firm always reserves a considerable portion for itself. Moreover, since SIDOR employees who receive instruction from foreign companies are not trained to process and put the technology into usable form, another fraction of what is available is thereby lost. Later, because these individuals have not received training in teaching techniques, and because the other SIDOR employees have not been trained in appropriate study methods, another large fraction is lost.

Five specific objectives were initially formulated for training the Human Resources Group: 1) to form a structured cohesive group whose members exhibit cooperative, task-oriented, productive behavior and interact to improve each others behavior by applying the principles of feedback and positive reinforcement; 2) to promote the acquisition of teaching and study methods; 3) to impart knowledge of techniques involved in composing self-instructional manuals and to help participants learn by doing — by composing such manuals for the industrial equipment they work with[2], and by planning courses on writing self-instructional manuals; 4) to teach participants to work according to previously established objectives; and 5) to achieve a situation in which Human Resources Group members successfully "pass on" what they have learned to other SIDOR work groups such that the latter also become independent multipliers of behavioral technology and processors of industrial technology.

Members of the Human Resources Group were selected according to three criteria: 1) the opinions of the employees of the Flat Rolled Products Plant (via questionnaire); 2) the consent of the candidates themselves; and 3) the acceptance of the candidate's immediate superior. The fact that employees were consulted apparently increased the probability of cooperative interactions between Human Resources Group members and other SIDOR employees.

The Human Resources Group was trained in two major phases, the first in a simulated work environment (six hundred hours), and the second in a real work environment (one thousand hours).

The first phase began with a behavioral team-building exercise based on feedback and positive reinforcement principles. This exercise produced the desired cooperative, task-oriented, productive repertoire mentioned in the first training objective given above. During the team-building sessions, participants diagnosed the problems of the Flat Rolled Products Plant and identified some of their own behaviors that contributed to these problems. Behavioral goals were set up to modify these undesirable behaviors and establish and maintain behaviors that would contribute to the resolution of the corresponding problems. The remainder of the training done in the simulated work situation was invested in training in the formulation and the use of specific objectives, in imparting study and teaching methods, and in providing training and practice in planning, organizing and supervising seminars on human resource development. Thus, during the first phase all of the objectives for preparing the Human Resources Group, with the exception of the objective related to the composition of self-instructional materials, were promoted in a simulated environment.

The omission was made up for in the second phase, and extra work was done on study and teaching skills (Objective "2" above), on carrying out behavioral team-building workshops (Objective "5") and on working with specific, real human resource problems (also Objective "5").

The Human Resources Group could not be expected to attend to all of the problems in the Flat Rolled Products Plant due to the number of employees involved (1200); thus the group chose the electrolytic cleaning production line for their first work project. *This production line was chosen due to fact that it was plagued with more serious difficulties than any other line in the plant.*

In the process of training the members of the Human Resources Group, the trainees and their USB team advisors drew conclusions about the nature of the problems of the Flat Rolled Products Plant and about those of SIDOR in general that differed in important respects from their initial opinions. These conclusions are reflected in the objectives set by the members of the Human Resources Group for their project with the personnel of the electrolytic cleaning line. The first and most important objective was formulated as follows: *improve interpersonal relations between subordinates and superiors and among co-workers in general by means of feedback, positive reinforcement, modeling and the elimination of punishing practices.* It will be recalled that the difficulty being attacked here is the most important factor in the causation of personnel turnover, which, in turn, has highly negative effects upon production. It was reasoned that by inclining the balance of the stimulation impinging on the employees to the positive side, these two resulting difficulties and a multitude of lesser ones could be significantly reduced.

The objective of acquiring and preserving technological information and that of working on the basis of formal and previously set goals also figured in the Human Resources Group's plan for the electrolytic cleaning line, although it was recognized that the contribution via the application of such skills depended in large measure on the degree to which changes in interpersonal relations could be achieved.

In carrying out its work with the employees of the electrolytic cleaning production line, the Human Resources Group used the techniques of punishing verbal stimuli in on-the-job situations and in a number of small behavioral team-building workshops. Superiors were consistently reinforced for their use of immediate positive reinforcement of cooperative, task-oriented and productive behaviors when these were exhibited by their subordinates. As in the experience reported in "Business, Behaviorism, and the Bottomline", reinforcements were verbalizations and gestures; but unlike that famous project the reinforcements employed in the electrolytic cleaning line were not made on the basis of pencil and paper records kept by employees or supervisors. A number of factors (e.g. educational level, the nature of the work process, etc.) made such records difficult. Nevertheless, members of the Human Resources Group and members of the USB team did sample the behavioral team-building practices of superiors and co-workers regularly.

The results of the work done by the Human Resources Group during this initial period (October, 1977, through May, 1978) were highly positive. Superior-subordinate relations improved greatly as did relations between other co-workers. Maintenance and industrial operations practices became more orderly and effective. For example, where electrical, mechanical and hydraulic maintenance personnel previously could not work in an integrated fashion, teamwork and cooperative behavior increased. Personnel turnover dropped off and stabilized at about 18%, which though still high was a definite improvement in light of the grim projection shown in Figure 1. Observers noted a marked increase in employee verbalizations about "belonging" to the organization and "expressions of satisfaction" about having participated in the behavioral team-building project. Employees at all levels exhibited a greater generalized ability to analyze problems openly and to work toward solving them in an organized collective fashion. The positive results are still felt by line employees three years after the initial project concluded (SIDOR, 1980).

During the first five month period of its work with the electrolytic cleaning line, production increased substantially, and the line even outstripped three production lines that traditionally had shown the best production curves.[3] During that period the monthly averages for these three lines showed increases in production (the tin coating line averaged 15.15% per month; the tandem line averaged 14.12%; and the quenching line averaged 10.09%) but none of these average increases approaches the 40.07% average monthly increase achieved by the electrolytic cleaning line. An analysis of variance and a Tukey's HSD Test showed that inter-average differences are fully significant at the 0.05 level in favor of the electrolytic cleaning line for comparisons with the quenching and tandem line averages, and practically significant in favor of the electrolytic cleaning line for comparisons with the time coating line average. The electrolytic cleaning line is the only production line in SIDOR that has sustained monthly averages of 40.07% or more during a five-month period.

Although the improvement of superior-subordinate relations undoubtedly was the most important factor in the achievement of the increase in production, all of the positive changes in human behavior and social relations noted above seem to have contributed also.

These results support the proposition that team-building techniques that have been structured in accord with behavioral laws increase the probability of productive and other desirable work-related behaviors.

Unfortunately, behavior modification in industrial settings is not a simple matter, and as we shall now see, the initial project produced some less pleasant consequences that must be analyzed.

The Managerial Reaction to the Success of the Initial Project and the Effects of this Reaction

It is well-known that the behavior of human beings in their usual social environments is at any given moment a function of numerous current contingencies of reinforcement and punishment and a complex behavioral history. Elements of the individuals' behavioral history often constitute crucial contextual variables and a knowledge of these elements frequently permits the explanation of seemingly paradoxical effects of current contingencies.

The initial behavioral team-building project with the employees of the electrolytic cleaning production line is an example of this latter possibility. Certain assumptions are commonly made about how successful team-building will affect the environment and behavior of employees and managers. The discussion that follows centers upon seven such assumptions. Successful team-building supposedly: 1) inclines the balance of stimuli impinging upon employees more toward the positive side; 2) increases the frequency with which employees identify, analyze and act upon the problems that affect them as a group; 3) increases the frequency with which employees exhibit numerous other work-related responses that have been designated as target behaviors; 4) reduces the frequency with which employees exhibit apathetic, interruptive and aggressive behaviors having as their object superiors, property belonging to the industrial organization, or company practices; 5) inclines the balance of stimuli impinging on managers more towards the positive side; 6) increases the probability that managers having the power to decide, will make further use of team-building techniques; and 7) increases the probability that desires of employees for better working conditions and other benefits will be acted upon by the managers in charge, at least where increased productivity due to team-building makes these actions economically feasible. In the case of the electrolytic cleaning production line, the initial behavior of the line's personnel was in accord with assumptions "1" through "4", but the gains with regard to work-related target behaviors (see "3" above) and with regard to the elimination of undesirable behaviors (see "4") were partially lost due to the fact that the managerial reaction was not in accord with the assumptions regarding their behavior in critical respects. Of the assumptions having to do with manager behavior only the sixth (the probability that the use of team-building by managers will be increased) seems to have been justified in this case. The result of the team-building effort most vital to an understanding of the remaining results is that the very success of the project *reduced* the frequency and the inferred probability of actions by certain area managers in response to employee demands for better working conditions.

These results are not only paradoxical in view of assumption "7" which predicts just the opposite result, but also in view of the fact that the supposed general objective of SIDOR is to maximize steel production. On many occasions SIDOR's policymakers have taken actions to maximize steel production even when these measures have worked against possibly more important long-term developmental interests of the industrial organization (e.g. by creating dependencies upon foreign advisors and technicians). Where such priorities exist it is reasonable to expect that significant production increases will generate positive managerial responses.

The fact that key area managers did not act to reinforce the cooperative and productive behavior of the electrolytic cleaning production line employees seems to have been due to a combination of two factors. First, behavioral team-building did strengthen employee behaviors requisite to the identification, analysis and action upon problems, including their own with regard to working conditions. This increase in the frequency of problem-solving behaviors by employees fell into place alongside an existing second factor: a history of discriminated punishment in which increases in the strength of verbalized demands for better working conditions had been intermittently but frequently followed by sabotage, strikes, slow-downs and demonstrations. The area managers having the power to make decisions regarding how to process the demands of the employees responsible for the increased production levels on the electrolytic cleaning line resolved to deny these demands and to withdraw support from the Human Resources Group because of their own behavioral histories of punishing events involving individuals and groups having popular support. One key area manager stated this position quite succinctly in a conversation with one of the authors. What he said was this: "We are not going to attend to the demands of the workers because to do so would be to allow [the Human Resources Group] to become more powerful than the unions". Moreover, actions were taken by management to reduce the number of members of the group to eight individuals; all production personnel (electrical, hydraulic and electronic technicians) were returned to their pre-training jobs.

It is not surprising that those actions reversed the very behavioral trends most responsible for the increases in production. Table 1 summarizes the changes observed in the variables corresponding to the seven assumptions regarding team-building discussed above.

Table 1 shows that the behavioral team-building effort produced two important and *lasting* beneficial consequences for the employees of the electrolytic cleaning line: the balance of social stimulation, especially with regard to that produced by superior-subordinate interactions inclined considerably toward the positive side, and the enhancement of the ability to identify, analyze and act upon their own problems. The increase in desirable (target) work-related behaviors and the corresponding decrease in apathetic, interruptive and aggressive behaviors directed toward superiors and plant property and practices were influenced by the negative managerial reaction described above, though the frequency of these behaviors did not return to pre-training levels. Therefore, the 40.07% increase in production was not maintained after the managerial counter measures were taken, but fell to 25% above the initial pre-project level and has remained thereabout ever since.

	Variable	Ideal effect of team-building	Electrolytic cleaning line: initial situation	Effect on the electrolytic cleaning line
EMPLOYEES	Positive-aversive social stimulation	Increase in positive stimulation	Inordinately aversive	Considerable increase in positive stimulation (maintained)
	Ability of employees to identify, analyze and act upon problems.	Increase	Relatively low	Considerable increase (maintained)
	Frequency of positive employee target behaviors	Increase	Low	Considerable increase (partial recouperation of initial level)**
	Frequency of undesirable employee behaviors	Decrease	High	Considerable decrease (partial recouperation of initial level)**
MANAGERS	Positive-aversive stimulation	Increase	Generally positive	Increase
	Probability of sponsoring further use of team-building	Increase	Not applicable	Increase
	Probability of manager attention to employee requests for improvements	Increase	Low	Decrease

TABLE 1

Résumé of effects of behavioral team-building compared with ideal effects and the initial situation. The asteriks (**) after parenthesis signifies changes that took place after managerial reaction.

In spite of the preemptive aggression by certain area managers, the evidence indicates that the project imposed no tangible aversive consequences upon them; and for line managers the project-produced increases in production had highly positive consequences (line managers receive bonuses and social "prestige" reinforcement when production increases significantly). It is also noteworthy that even the area managers who acted to reduce the size of the Human Resources Group continued or increased their support for the use of team-building techniques. Apparently management considered that the techniques would be highly valuable, if they could be applied by groups of individuals not having the historical, personal, and (supposedly) political ties[4] that the original Human Resources Group members had with other line level employees.

Forging a Revised Strategy

When employees who have boosted production significantly ask management for improvements and do so, not in terms of exorbitant salary increases but in terms of clean bathrooms, decent eating facilities, adequate intraplant transportation, and an end to favoritism in the assignation of housing, and are met by the kind of aggressive responses described, the conditioning one receives in the everyday environment promotes labeling the managers as bad or abusive people. The behavior modification approach is, of course, inhospitable to such hard and fast labelings and to the simplistic explanations that underlie them. Thus, the immediate reaction of the USB advisory team and the remainder of the Human Resources Group was based upon the objective of counteracting the current effects of managerial histories of punishment.

The tactics employed by the USB advisory team and the Human Resources Group included active and passive aspects. The actions taken centered upon assuring that an objective evaluative document on the project would be available to, and would be studied by, the industry's decision makers. This study emphasized the increase in production, its dependency upon changes in employee behavior and the extremely low cost of the team-building project in relation to the benefits it produced. This document was complemented by formal presentations and conversations between the head of the USB advisory team and SIDOR managers. It was also assumed that since the actions taken by the USB team and the Human Resources Group were not and had never been politically or subversively motivated, this fact would become apparent to management on the basis of subsequent developments in the behavior of the employees working on the electrolytic cleaning line and among the members and ex-members of the Human Resources Group. In order to assure that these passive aspects would be attended to, an effort was made to inhibit protests and complaints about the managerial reaction.

While these steps were being taken, members of the USB advisory team and of what remained of the Human Resources Group took stock of the implications of the behavioral team-building efforts and the managerial response to it for future reference.

An ethical problem is posed by the fact that the behavioral team-building effort produced tangible benefits for SIDOR and for line managers (bonuses), while the behavior of the employees who were directly responsible for increasing production was not tangibly reinforced. As Table 1 indicates, the only significant long-term reinforcing consequences for these employees reside in improved relations among superiors and subordinates and among co-workers in general, and in having acquired certain special skills in situation analysis, human relations and teaching. Thus, the possibility that future behavioral team-building efforts might be approved on the assumption that they produce "something for nothing" could logically be related to the perpetuation of unsatisfactory working conditions and policies that could be eliminated with relatively little effort on the part of management. Moreover, it became obvious during the initial project, that many of the efforts that *were* being carried out to improve working conditions and foment organizational development could be much more effectively handled within the framework of an integral strategy based on the needs of the employees *as expressed by the employees* and the needs of SIDOR as an industrial and commercial enterprise.

The initial behavioral team-building effort had allowed us to get our "foot in the door" and show that such techniques could produce highly desirable results. The tactics employed to counteract the effects of punishment that apparently produced the paradoxical managerial reaction to this success, subsequently proved successful: the members of the Human Resources Group and the individuals they had trained and aided did *not* behave as politically-oriented groups had behaved in the past.[5] Although the gains made through the behavioral team-building effort were not maintained at peak levels after the countermeasures were taken (see Table 1), no protests were carried out, no acts of sabotage occurred, and other desirable work-related behaviors remained considerably above pre-project levels. These facts had a pacifying effect upon management and thus facilitated attention to the evaluative document prepared by the USB advisory team and the Human Resources Group, and permitted the presentation of the integral strategy described above.

Recent Developments and the Future of the SIDOR-USB Project

Good technology is contagious. As a result, many of the practices initiated on the electrolytic cleaning line have been taken up by other organizations within the Flat Rolled Products Plant; thus not only the electrolytic cleaning line but the plant in general has earned a reputation for being among SIDOR's most reliable and efficient units. These attributes are generally explained in terms of the work done by the USB advisory team, the Human Resources Group and the personnel trained by the latter. The Human Resources Group has been enlarged again, and its membership has been diversified by including personnel from dependencies other than the Flat Rolled Products Plant. Through the continued efforts of the HRG, improvements have been made in eating facilities, sanitary facilities, accident prevention practices and other important working conditions; and other gains are in sight.

Although only a few months passed between the negative managerial reaction and the beginning of the second behavioral team-building project, the first major increase in the magnitude of the SIDOR-USB project was achieved early this year in the Billet Plant. One of the present authors is the project chief and as such attends the meetings of the Plant's Board of Directors.

The maximum productive capacity of the Billet Plant's equipment is 1,200,000 metric tons a year. Its production level during the twelve months preceding the beginning of the present project was only 300,000 metric tons. The nature of the project in the Billet Plant is quite similar to that which was carried out in the Flat Rolled Products Plant with regard to the behavioral team-building techniques being employed; but is quite different in that the integral strategy outlined above is being put into practice. The project chief's participation in the meetings of the Plant's Board of Directors provides the opportunity to suggest and defend specific improvements in working conditions and related matters. These suggestions are based upon a continuing analysis of employee needs and demands, and are frequently decisive considerations in the actions taken by the board.

An attempt is being made to leave nothing important out. Taken individually, the improvements made in the social and physical conditions under which employees work may not be impressive (e.g. reorganization of mealtime practices, sanitary improvements, the construction of covered walkways to protect employees from inclement weather, improvements in intra-plant transportation, the establishment of equitable practices for family aid, noise reduction, etc.); but taken collectively they seem to mean quite a lot to the employees. The use of tangible non-monitary reinforcers as well as social reinforcers and the fact that contingencies of reinforcement pertinent to production are being managed at all levels are hallmarks of the integral strategy that is being employed in the Billet Plant.

Another novel aspect of this project is an attempt to improve efficiency in furnace handling by putting Italian experts who have undergone behavioral team-building experiences (with emphasis on technological transfer) in charge of a furnace and assigning a SIDOR employee to observe each Italian expert.

In addition, on either side of the furnace handled by the Italians and their SIDOR apprentices, furnaces handled by "secondary" SIDOR apprentices duplicate the steps carried out by the "model" furnace team.

The on-the-job work in the Billet Plant began on April 30, 1980 and some positive results with regard to production have already become apparent as of this writing. Table 2 contains information on the number of heats and the number of metric tons of steel produced during the four months prior to the beginning of the project and during first four months of on-the-job activity.

MONTH	HEATS	METRIC TONS
Jan. 1980	228	33,500
Feb.	211	32,500
Mar.	228	31,740
Apr.	230 (Average =224)	32,650 (Average =32,597)
May	254	36,600
Jun.	246	34,500
Jul.	260	36,500
Aug.	282 (Average =261)	39,500 (Average =36,775)

TABLE 2
Changes in the number of heats and tonnage, Billet Plant.

As Table 2 shows, production for May, 1980 was thirty heats or 4,103 metric tons above the average for the previous four months. The amount of steel produced in May set a new record for the Billet Plant — a record that was broken again in August. The behavioral team-building project in the Billet Plant promises to be even more productive for SIDOR than the initial project at the Flat Rolled Products Plant. The initial project cost SIDOR an estimated $280,000 and produced $5,581,000 in benefits. The Billet Plant projects costs SIDOR only $79,000 per year. Each heat produced is worth about $34,000. As Table 3 shows, the average number of heats per day has increased from 6.5 to 9.5. An increase to four heats per day above the initial average is in sight. When this is achieved the value of the additional steel produced in one day will be almost twice the yearly cost of the team-building project.

Variable	JAN-APRIL Average	MAY-AUG Average
Heats per day	6.5	9.5
Substandard heats	9%	7.3%
Absences	4%	2.5%
Personnel Turnover	4%	1%

TABLE 3
Other changes attributed to the team-building effort, Billet Plant, SIDOR.

The personnel turnover rate at the Billet Plant was well below the SIDOR average to begin with but, as Table 3 shows, it has been reduced even more since the team-building project began. Absenteeism has also been substantially reduced.

The USB advisory team and its SIDOR collaborators are also working in several other dependencies including the Departments of Supply, Industrial Relations, Raw Materials and Internal Transportation. These projects are in the planning on training stages.

One of the most exciting projects that is now underway is the Industrial Training Assistants Program that the Universidad Simón Bolívar, offers to SIDOR employees. The coursework, designed and supervised by professors of the USB Independent Studies Program, leads to an intermediate or technician level degree. The training includes thirty courses which require sixty hours of work each on the average. All literate employees are eligible for the program. All candidates receive instruction in the same subjects, but college graduates receive more advanced instruction. These differences are reflected in the degree: the degree granted to college graduates is considered special training for the company's executives in human resource management and industrial development; the degree earned by other employees enables them to work as industrial training assistants on production line projects or at section level.

CONCLUSIONS

The experience of the USB advisory team in SIDOR indicates that behavioral team-building centered upon positive reinforcement and feedback can be highly successful, even in relatively inhospitable and complex industrial environments.

In our initial efforts in the Flat Rolled Products Plant the assumption was implicity made that success in boosting production and in strengthening a variety of desirable work-oriented behaviors would increase the probability that management would reinforce these employee behaviors by attending to employee demands for better working conditions. Our estimate of the situation did not take into consideration the effects of punishment associated with employee demands that characterized the behavioral histories of some key area managers. When our successful activities produced consequences that were exactly the opposite of what we had expected in this respect, actions were taken which helped management discriminate between the consequences of supporting employee demands processed by the USB advisory team and its SIDOR offshoots and the punishing consequences that historically had followed such demands presented by some other groups.

Had these efforts at producing discriminative behavior not been successful, we would have been forced to consider that our behavioral team-building efforts — their effectiveness aside — had been conducive to the maintenance of unnecessarily aversive working conditions and to the strenthening of exploitive uses of behavioral technology. To avoid abusive employment of behavioral technology, industrial behavior modifiers must acquire the support necessary to establish contingencies of reinforcement for behaviors of persons at the various hierarchical levels of the organization in question. Where degrading working conditions exist the reinforcers manipulated should include tangible benefits and services appropriate to the elimination of such conditions, as well as intangible social reinforcements.

On the other hand, had we imposed conditions based upon these ethical considerations upon SIDOR's managers from the outset, it is improbable that they would have considered them feasible or acceptable. The initial behavioral team-building efforts allowed us to "get our foot in the door", and perhaps this is a justifiable function of behavioral techniques that are based on the use of intangible social reinforcements. If such techniques allow the humanitarian behavior modifier to "get his foot in the door" and exploit his success to "sell" an integral strategy that takes into consideration employee interests as well as efficiency and productivity, a valuable social contribution is made thereby.

Just where the kind of work reported here lies on traditional continuance of moral, social and political action is not considered to be a pressing issue. As noted, the individuals involved as agents of change were labeled "leftists" by some managers and "reformists" by some professed leftist organizers. There is no reason to hold that the agents of change mentioned herein are "above" traditional, moral, political or social concerns in any general sense. Nevertheless, the worldview cultivated through contact with the science of behavior is conducive to analyzing moral issues only when doing so produces some practical advantage. Occasional managerial resistance to changing unsatisfactory working conditions is seen in the same light as is the insistence of employees and humanitarian behavior modifiers on making just those changes: they are seen in the light of differing histories and current contingencies of reinforcement and punishment. What is to be gained by asking whether or not managers were justified in behaving according to their histories of conditioning? The philosophies that our behavior, as the agents of change, are consonant with may well be another question, but we have not attempted to define that either. Nevertheless, the authors confess a certain curiosity as to whether B.F. Skinner would consider our work consonant with this statement:

> A nonpolitical evolutionary approach might begin with a small core of people who are highly informed with respect to both existing social issues and behavioral principles (Skinner, 1979, p. 51).

Footnotes

[1] *Except where otherwise stated, all information from this point forward is descriptive of this initial period.*

[2] *Where such manuals existed they were written in languages other than Spanish and were otherwise deficient.*

[3] *A major fire in another area of the Flat Rolled Products Plant in June 1977 required such a massive repair effort that the plant had to shut down for several weeks. This unfortunate event marks the end of the period for which results were measured. The fire is considered the end of the initial project rather than a mere interruption due to other unfortunate events to be noted shortly.*

[4] *For a variety of reasons some of the groups members were considered to be "leftists". Also the fact that one of the authors declined the 7% of the consultants fee paid by SIDOR to the Universidad Simón Bolívar that he was entitled to by law as team leader was interpreted by some managers as a political tactic rather than an act of social concern.*

[5] *A curious piece of evidence supporting this contention is related to the fact that the behavioral team-building project came under fire from Marxist and other left-of-center party organizers in the plant because the project had supposedly "taken the edge off" of some activists. Activists, according to these organizers, should frequently exhibit some rather conspicuous behaviors (eg. pronunciation of slogans, aggressive gestures and verbalizations, etc.). It was said that many activists had become more "analytical" and less "fired up" as a result of their training. These misgivings, like those expressed by managers, subsequently faded away.*

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