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Action Learning and Action Science: Are They Different?

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Action Learning and Action Science: Are They Different?

Executive Summary

Action learning and action science constitute two popular, so-called "action technologies" - organizational development (OD) methods which are concerned with the utilization of knowledge in service of action. While springing from the common tradition of action research, these two approaches vary quite considerably at the level of implementation. In particular, for OD practitioners, there are differences regarding how one pursues the role of facilitation. The approaches also appear to produce differential effects on participants as well as on the organization or unit sponsoring a change effort. This article attempts to present some clear distinctions between action learning and action science according to a set of action technology criteria. It is hoped that by consulting this article, change agents can become more skilled in their own theory and practice and more aware of diverse intervention methods and effects.

Action Learning and Action Science: Are They Different?*

There are many epistemological technologies which have evolved in the last fifty years which have used the term "action" as part of their reference label. Although not always credited, Kurt Lewin (1946) is this author's nomination as the founder of these so called "action technologies" in his reference to action research as a means of conducting systematic inquiry into group phenomena. The common basis for most of these technologies is that knowledge is to be produced in service of action (Peters and Robinson, 1984). As opposed to "positivist" models which were designed to develop theories purposely separated from practice in order to predict truth, action research did not separate theory from practice. Theory would be applied directly to practice in the field using a collaborative approach combining scholars and practitioners. Action research, in particular, acknowledged rather than rejected the role of personal feelings within the research context. Theorists and practitioners would both open themselves up to an inquiry process which would seek to "unfreeze" the assumptions underlying their actions.

Evolving from action research are two of the most popular action technologies in use today, action learning and action science. Action learning, most practiced in Europe and first associated with the work of Reg Revans (1982), is based on the straightforward pedagogical notion that people learn most effectively when working on real-time problems occurring in their own work

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setting. Action science, most practiced in the United States, and associated with the work of Chris Argyris (1982), is an intervention method based on the idea that people can improve their interpersonal and organizational effectiveness by exploring the hidden beliefs that drive their actions.

The purpose of this article is to distinguish these two action technologies, especially to assist organization development practitioners who may serve as facilitators in both technologies. Readers who are unfamiliar with either technology may consult the sidebars for an overview. Below, after reviewing their foundational similarities, we will consider the principal differences between these two methods. As we examine these differences, we will consider some of the advantages and risks associated with each approach. Readers who themselves operate in facilitator roles might wish to reflect on their own intervention styles to determine if they have leanings toward one technology over the other. If they are capable of using both, they are invited to consider whether they should be using them sequentially or simultaneously. What are the differential effects on participants? These and other issues will be reviewed in the material to follow. To illustrate the concepts in use, transcriptions from actual facilitator interventions, either of mine or of those published by others, will be used. My hope is that by becoming aware of distinctions in action technologies, OD facilitators will be able to better forecast and illustrate for participants respective methods and likely effects.

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What is Action Learning?

Action learning describes a developmental approach, used in a group setting but affecting the individual and organizational levels of experience, which seeks to

apply and generate theory from real (not simulated) work situations. In Revans' original conceptualization, learning results from the independent contributions of programmed instruction (designated P) and spontaneous questioning (designated Q). P constitutes information and skill derived from material already formulated, digested, and presented typically through coursework. Q is knowledge and skill gained by apposite questioning, investigation, and experimentation. For Revans, Q was the component that produced most behavioral change since it results from interpretations of experience and knowledge accessible to the learner. These interpretations are bolstered by feedback from mutual learners who participate in a debriefing of the learner's workplace experiences. Hence, actions taken are subject to inquiry about the effectiveness of these actions, including a review of how one's theories were applied into practice. Participants learn as they work by taking time to reflect with like others who offer insights into their workplace problems.

In a typical action learning program, a series of presentations constituting programmed instruction might be given on a designated theory or theoretical topic. In conjunction with these presentations, students might be asked to apply their prior and new knowledge to a real live project which is sanctioned by organizational sponsors and which has potential value not only to the participant but to the organizational unit to which the project is attached. Throughout the program, students continue to work on the projects with assistance from other participants as well as from qualified facilitators or advisors who help them make sense of their project experiences in light of relevant theory. This feedback feature principally occurs in learning teams or "sets" typically composed of 5-7 participants. During the learning team sessions, the students discuss not only the practical dilemmas arising from actions in their work settings, but the application or misapplication of concepts and theories to these actions. Further, the group develops a social culture in its own right which presents participants with lessons

regarding group dynamics. Team members also provide encouragement to one another.

Not all organizational problems are solved or are even meant to be solved in action learning. Rather, the experience is designed to confront learners with the constraints of organizational realities, leading oftentimes to their discovery of alternative and creative means to accomplish their objectives.

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What is Action Science?

Action science is an intervention approach, aimed also at the individual, team, and organizational levels of experience, for helping learners increase their effectiveness in social situations through heightened awareness of their action and interaction assumptions. Individuals' mental models, the images, assumptions, and stories carried inside their minds of themselves and of others are often untested and unexamined and, consequently, often erroneous. In action science, these mental models are brought into consciousness in such a way that new models are formed which may serve us better (Senge et al., 1994).

Action science thus calls for the deliberate questioning of existing perspectives and interpretations, a process referred to by Argyris and Schön (1978) as "double-loop" learning. When a mismatch occurs between our values and our actions, most of us attempt to narrow the gap by trial and error learning. We also prefer to maintain a sense of control over the situation, over ourselves, and over others. In double-loop learning we subject even our governing values to critical

reflection creating free and informed choice, valid information, and high internal commitment to any new behavior attempted.

The set of understandings with which we group the world is referred to by action scientists as an action model. In many organizational situations involving interpersonal interaction, especially in those involving threat or embarrassment, we may automatically invoke a so-called "Model I" program which allows us to save face, avoid upset, and maintain control. Since this kind of reaction often produces self-reinforcing patterns that seal off self-discovery, action science facilitators work with students to engage in "Model II" responses which allow for the exploration of interpersonal differences and mutual responsibility.

Donald Schön (1983) prefers the term "reflection-in-action" to characterize the rethinking process which attempts to discover how what one did contributed to an unexpected or expected outcome. In order to engage in reflection-in-action, students might start by describing a situation and then, upon reflecting on it, provide a frame that characterizes not only their intentions but explains the inferences they draw from others' responses. Then, they might inquire as to how others in the group see it. Group members might reflect upon these frames and offer feedback but may subsequently begin to surface and test their own underlying assumptions and respective reasoning processes. The aim is to narrow inconsistencies between one's espoused theories and one's theories-in-use. Espoused theories are those characterizing what we say we will do. Theories-in-use describe how we <u>actually</u> behave although its revision of our espoused values is often tacit. The goal of action science is to uncover our theories-in-use, in particular, to distinguish between those which inhibit and those which promote learning.

Are They Different?

Experienced facilitators tend to acknowledge a fair amount of similarity between these two action technologies. While the "work" within each group tends to focus on one individual at a time, the ultimate aim is improvement of interpersonal and organizational behavioral processes. The overall emphasis, as indicated at the outset, is on the utilization of knowledge in service of action. The technologies are designed to be participatory and even collaborative. The specified methodology is experimental and predominantly conducted in a group setting. Each encourages the presence and skillfulness of a facilitator who helps the group make use of actual situations as opposed to simulated experiences. There is also considerable focus on re-education and reflection. This means that the participants, who are normally adult practitioners, seek to improve themselves especially in regard to their human interactions and practices. They accomplish this primarily through critical self-reflection which in raising consciousness tends to permit more control over one's actions.

Behind these similarities, which are also to some extent generic to action research methodology, there are some significant differences between action learning and action science especially at the level of implementation. Hence, when one assumes a facilitation role, it becomes critical to know where, for example, action learning ends and action science begins. The two methods will be distinguished based upon a set of criteria adapted from Ann Brooks and Karen Watkins (1994). The examples chosen will also demonstrate some important qualitative differences in interaction style and process.

Purpose: Although action learning and action science each seeks to benefit individuals by helping them become more effective in achieving useful action,

especially in their organizations, action science goes deeper than action learning. Action science explicitly examines the reasoning processes used by individuals in the belief that one can only improve action as one's mental models become more explicit. As people in groups behave more consistently with their espoused beliefs and make their inferences known, the level of public discourse naturally improves. Action learning does not require this level of depth. Although one's assumptions about actions taken are typically examined, action learning is more concerned with behavioral change through public reflection on real work practices.

Consider as an example the case of a vice president of a retailer of lumber and hardware products who is concerned about the lack of commitment to the business on the part of the chain's part-time check-out clerks. He has undertaken a project to assess their concerns to see if he can determine why their motivation is lower than their full-time counterparts. In an action learning set, the facilitator might start by having this member, call him Joe, describe his project and anticipated intervention in clinical detail. In a fairly well-developed set, members may join in by probing these details and the underlying assumptions of his plans and actions. For example, Joe might determine that the best way to obtain data from the part-time clerks would be to conduct "focus groups" in groups of three or four corresponding to their work shifts. A group member in the set might challenge the focus group methodology as too intimidating to obtain reliable information, that Joe would be better off interviewing select clerks individually or even have someone else less senior in the company interview them. Joe would then reflect on his intervention approach and decide whether he might change his plan of action. Other questions might attempt to ascertain why Joe has chosen this project over others. Is this one that the President has a particular interest in, or is it a genuine concern of Joe's? In some action learning sets, questions and responses of this nature might ensue for the entire duration of the meeting. Notice that the

focus tends to be on this one member alone, at least until time is allocated to another member or to the set as a whole. There is a lot of probing going on, but it tends to focus on the member's plans and actions that are typically taking place or about to take place in a separate work setting. When the focus shifts to the set itself, attention is directed to how to make the group more effective as a learning vehicle for its membership. This might require learning how to engage in active listening and offer feedback more effectively, how to check on one's assumptions about others, how to apply classroom theories in practice, and so on.

An action science group in probing the underlying reasoning processes used by individuals in the group has a different texture. It might start by focusing on Joe's problem with his part-time check-out clerks. But rather than spending time planning and offering suggestions to him regarding useful interventions, the facilitator and group members will focus a lot more on Joe and his organization. For example, the facilitator might start out by asking Joe why this problem has been standing around looking for a solution? Joe might answer that it's because it hasn't been a high priority item and that the managers assumed that the demotivation of the part-time staff couldn't be helped. The facilitator might then ask Joe if he feels the same way as "management." Joe might answer that he has always been concerned but didn't feel that the president considered it a priority. At this point, the facilitator might ask whether Joe, as a rule, disavows those issues with which he believes the president won't agree. Joe explains that not only does he monitor what he says but that others in management do the same. No one, including himself, wants to be seen as contradictory. In action science terms Joe has not only offered an observation but has provided an initial inference regarding his perception of the behavior of others.

Although it might be possible to stop here, most action science facilitators would inquire whether Joe would like to pursue the issue further. Assuming he

would, the facilitation could proceed using a number of different methods. For example, Joe's inferences could be drawn out more by asking what he assumes drives the president's behavior. The facilitator and group might also inquire what makes Joe and his colleagues so reluctant to bring up so-called "contradictory" issues with the president. Another technique might be to have Joe prepare a case in which he recounts a conversation he might have with the president about a controversial issue. In the margin or on one side of the page, he would indicate what he and the president were thinking when they responded in particular ways. A conceptual map might also be drawn wherein Joe displays his action strategies using both Model I and Model II learning approaches. Joe might be invited to role-play a conversation with the president, played by another group member, wherein he might practice a Model II action strategy. Finally, an "on-line" conversation might be constructed if Joe is willing to share how he restricts his contributions with particular members of the group. Whatever method is chosen, the ultimate purpose is to surface defensive or inhibiting behaviors which might be blocking operating effectiveness.

As can be seen in the above example, although both technologies seek to benefit the organization, action learning's impact is often more direct and short-term. Projects are undertaken which are designed to have an immediate and projected residual impact on the sponsoring unit. In action science, although real problems constitute the most appropriate data for analysis, it is only when a reasonable number of organizational members begin to operate under Model II rather than Model I assumptions that a significant shift in the culture may be experienced.

Finally, the example points out differences regarding the depth of change in each intervention. Although both focus on interpersonal relationships, in this case between Joe and his co-workers, most particularly his boss, action science

intervention also narrows in on Joe's intrapersonal cognitive awareness, namely, his perceptions about his own functioning in given situations. Joe is also given the opportunity to examine his inferences behind decisions to act or refrain from acting. Action learning does not require this level of cognitive awareness. The focus is more instrumental, that is, more concerned with perceptions about changing work behavior and work relationships (Harrison, 1970)

Epistemology: Each of the two action technologies approaches the acquisition of knowledge in a distinct way. Action learning is concerned with making tacit or placing into natural experience new ideas or theories recently acquired. It operates at a practical or rational level of discourse seeking to make meaning from experience (Habermas, 1971). It thus seeks to help students enhance their sensitivity to the ways others perceive or react to them as well as how they, in turn, respond to others. With new information in hand, students can learn to change their communication patterns to become more effective in the workplace. Action science, on the other hand, is concerned with making explicit or bringing into awareness individuals' theories-in-use which are deployed in practice. It operates at an emancipatory or reflective level of discourse seeking to explore the very premises underlying the perceptions we formulate of our world. Hence, whereas action learning seeks to contextualize learning, action science decontextualizes practice so that students can become more critical of their behavior and explore the premises of their beliefs.

Consider a case involving a participant named Dan in both an action learning and an action science group. An upper-level executive in a multinational firm headquartered in San Francisco, Dan is on a "fast-track" to senior management except that he has one flaw which he must overcome. It is his tendency to "blow-up" when others don't see things his way or when he perceives

them as not supporting him. He presents to the group a case in point where he alleges that his boss, Michelle, was planning to make some organizational changes including his department. At a meeting Dan accused Michelle of acting unfairly and irresponsibly. Michelle responded angrily and warned Dan not to talk to him in that way. The meeting escalated to a point of such emotional fury that it had to be terminated abruptly.

An action learning facilitator would encourage Dan to expound in detail about this scenario, testing out his assumptions about his and Michelle's behavior. With the support of the set, Dan might examine what he said that triggered such a strong emotional response by Michelle. Set members might exemplify how he broke some canons of healthy two-way communication, for example by using accusatory rather than descriptive statements. The focus at this point is attempting to clarify what happened through apposite questioning as a means of tracing the causes of the emotional outburst.

Once Dan understands what happened, the facilitator and set might turn to a consideration of ways to overcome this unfortunate sequence of events. Moreover, Dan might learn to improve the quality of his interactions with others who, like Michelle, might occasionally trigger an uncontrolled emotional response. The set, at this point, would continue to use a good deal of questioning to elicit as many recommendations from Dan himself as from set members. In one learning team in which I was facilitating, I recall in a similar situation that a member, who had recently received training in overcoming customer hostility, offered some interesting observations. In this case she would have suggested a few groundrules to Dan regarding how to become more aware of particular "red buttons" which trigger him and how to prepare for these moments. Some other considerations that might be brought up to help Dan might be: show empathy to understand where the other person is coming from, ask nondefensive questions, stay calm,

share information, explore alternatives. Finally, a set adviser might ask Dan to role play a subsequent conversation with Michelle (or some other colleague), played by another set member who would have been thoroughly prompted regarding Michelle's behavioral style. Dan would try to incorporate the set's suggestions and would receive ongoing feedback about his revised communication style and approach.

Action science intervention tends to require more direct facilitator intervention. For example, Chris Arygris, in working through an actual case from which this example was drawn (1982: 184-122), asked Dan to illustrate what made Michelle angry. He explained that, "he consciously or subconsciously challenged her and told her that she did not back me up." He went on to say that, "he had never criticized her that way before because they had developed a norm in their relationship of not criticizing one another. She knows that I am very sensitive and I know that she is also very sensitive when it comes to feelings about her supportive role with subordinates." At this point, Dan has acknowledged an espoused theory that he should not have been criticizing Michelle. However, he is unaware of his theory-in-use which is that when attacked, he responds in kind. Argyris (p. 191) used the following intervention:

> I can understand how you could resent [her accusations as the conversation escalated]. On the other hand, she was telling you not to attack her. On the other hand, she was, in your view, attacking and putting you down. So the first thing that hit me was that each of you is doing to the other what neither of you wants the other to do to you. Does it make sense to you that you are behaving in the same way?

The facilitator in action science attempts, as this case demonstrates (and this is a minor portion of the complete case that goes on for 29 pages), to help the student elicit the deepest defensive reactions that he or she brings into either the

group or into workplace interactions. In this case, Dan is led to understand the preconceived inferences that he draws from others' behavior and how his responses lead to an escalation of error. As in action learning, the facilitator also helps Dan design more constructive communication but does so by probing through to his theory-in-use, that is, his own responsibility. He would help Dan recognize his deep defenses and learn to diagnose and implement his own actions with more insight. Finally, a session might be devoted to methods of uncovering the premise assumptions underlying behavior in Michelle's group. This could lead to an analysis of the defensive routines that reinforces ineffective exchanges (e.g., no one criticizes anyone else around here).

At the point of intervention, facilitators need to acknowledge whether they plan to engage in a practical or emancipatory level of discourse. The practical level solicits inquiry regarding how others see someone who has been or is currently engaged in action. Action science by using emancipatory discourse takes the intervention into another perhaps sequential level. It becomes permissible to challenge not only the actor's theories-in-use but the questioner's perceptions and inferences to the point of questioning the entire system's assumptive frame of reference. For many participants and even for the system under scrutiny, action science intervention can be threatening as it has the potential to cause an entire reframing of the practice world. Even participants in responsible positions may not have sufficient authority or independence of action to challenge their cultures at the level of exposure sanctioned by action science.

Ideology: Although both approaches are committed to the expansion of self-awareness in participants, they use processes arising from different ideological foci. Action learning insists that learning emanate from the set participants themselves as they wrestle with live but puzzling natural phenomena. It refutes the view that

knowledge can be reduced to a single-all-inclusive perspective. Rather, contributions are not only accepted but encouraged from different and contradictory points of view. The basis for inquiry can be expert advice or folk wisdom arising from a community of practice. However, the ultimate aim in action learning is to help members discover solutions to their own problems. McGill and Beaty (1992) have called it "a democratic, liberating experience of learning." An example of this form of inquiry comes from Judy O'Neil who reported how a set member rather than the facilitator introduced a strategy known as "stop and reflect" (ARL™, 1996). During stop and reflect periods, members of the set stop and take time to gather their thoughts - often in writing - and then publicly let others in the set know what they're thinking. In this particular set, a member introduced this technique when two other members could simply not agree on an intervention strategy. One of the members recalled what happened:

> Stop and reflect...(was) sort of mind shattering..... We were going through a number of discussions where we were really at odds, that we just couldn't see each others' point of view. We finally did stop, and we wrote each thing down... And when we wrote it down, they were almost identical...by taking that little bit of time to actually understand the other person's viewpoint, we took a leapfrog as to where we were going.

Action science is committed to a particular kind of self-awareness, in particular, Model II double-loop learning. Accordingly, participants take personal responsibility to ensure that valid information is presented such that they and others in the group can make free and informed choices. Working towards win-win rather than win-lose solutions, participants operate under the criterion of justice to ensure a fair and mutual examination of personal data including feelings, assumptions, and inferences.

The different ideological foci expose participants to contrasting experiences. Action learning keeps the focus on project work under the assumption that the skills learned will generalize to other situations. Participants look to improve their effectiveness in their current work settings. Action science participants may be asked to create here-and-now on-line scenarios to help them work through blockages arising from contrasts between their reasoning and their actions.

It is typically more comfortable to begin a team intervention using action learning since its ideology does not prescribe a particular line of inquiry. As long as queries from set members focus on a target member's assumptions and actions and are considerate and empathic as opposed to self-interested and opinionated, they are generally endorsed. In a learning team which I was facilitating, a member was receiving a rich set of suggestions about how to create a unified team culture in a group constituted of staff from two different organizations which had recently merged. After recounting one constraint after another, she was met with a myriad of suggestions for overcoming them, be it an interpersonal issue with a particular staff member or a structural matter emanating from the roles introduced into the newly constituted team. About 45 minutes elapsed during which time the exchange was lively and frank. Other than offering a paraphrase to help her clarify how she reported dealing with a request from a vice president about formulating a mission statement, and a subsequent suggestion on another matter, I saw little need to intervene further. She finished her time slot by saying how much she appreciated everyone's suggestions and that she might even use some of them. This was followed by an awkward silence. Another team member interrupted the silence by offering to "go next." At this point I asked if everyone was ready to move on. All nodded agreement. I nevertheless decided to make an intervention which is more associated with action science ideology. As the next member began to proceed, I interrupted him and said:

> Excuse me, Paul. I'm sorry for interrupting you, but I detect that there may be unfinished business left over from Jennifer's work. Would you or anyone else mind if I shared my concerns? (No one voiced a concern, so I went on). I would like to propose a different kind of dialogue than the kind we've typically had. It will require us to look a little deeper into our defenses and how we choose to handle them when faced with an event characterized by deep emotion.

I went on to describe how I inferred that we all "felt" for Jennifer in her role in the new team but that at the same time we may have felt that our efforts to provide suggestions were somewhat rebuffed. I illustrated my inference by referring to her comment about "possibly" using some of them. I then asked what reactions members, including Jennifer, had to my comments. When people began to concur that they were somewhat perturbed by her apparent callousness, I asked if the group wanted to dig deeper into our interaction patterns as a group. It was at this point that the group chose to make a transition from an instrumental action learning orientation to an ideology which values introspection of intrapersonal reasoning processes and resulting interpersonal patterns.

The implication of this case suggests that OD practitioners, when serving as facilitators, may need to clarify ahead of time whether they will be pursuing action learning or action science change. Participants need to know in advance whether anticipated changes will arise from frequent questioning of their action interventions, common in action learning, or from in-depth exploration of their reasoning processes, more typical of action science. Likewise, organizational sponsors need to know whether they'll get a completed project of significance in addition to prospectively more effective interventionists, or an organizational culture in which there is far more consistency even under stressful conditions between what people say they will do and what in fact they do.

Methodology: The methods employed in action learning and action science are compatible in the sense that both use groups as the primary vehicle of participation and both focus on real problems. Further, although group development can be a secondary goal of the experience, both tend to focus on one individual at a time who is doing the "work." They also attend to real problems occurring in the participants' own work settings, though less so in action science. What differentiates the two is what is being processed at any given moment as well as the content of the discussion. Action learning focuses more on problems arising from the handling or mis-handling of "there-and-then" on-the-job project interventions. Although these problems are recent, they are not necessarily here-and-now issues arising from ongoing interactions among members of the set. Occasionally, interpersonal issues are surfaced but their elicitation is designed more to increase the communication effectiveness among set members than to probe into individual members' mental models. When the action learning set is functioning smoothly, feedback to individuals tends to be open, direct, and unburdened by hidden agendas.

Action science process, meanwhile, may work on workplace problems but is just as likely to focus on here-and-now interactions occurring among members of the group. Where workplace problems are chosen, the group process is not only designed to improve the work activity but serves as a means to help participants learn to initiate Model II action models in the work setting. Facilitators are also prone to create on-line experiments to help participants focus on their mental models. For example, they might elicit the attributions and evaluations the participants are making about themselves, about others, or about the situation being depicted, or they might have the participants slow down and focus on the inferential steps taken in leaping from data to conclusions (O'Neill, 1992).

One familiar method is known as "left-hand column." On the right side of a page split into two columns, participants might depict an actual or contemplated conversation with a co-worker. On the left-hand side, they write down those things that they thought or felt but did not say. For example, on the right side, Darlene might indicate:

> That's all right that you couldn't make it in yesterday. I know you had a bad cough and, as it turns out, I was able to finish the proposal on my own anyway.

On the left-side, Darlene writes:

> I was furious at your. How could you let me down like that. The proposal without your cost analysis now has no prayer. Big deal that you had a cough. I can't tell you how many times I've come in with far worse.

Upon presenting her left-hand column to the group, Darlene might be invited to respond to a number of queries leading to some extensive reflection. For example, what prevented her from saying all or some of her feelings? What inferential leaps was she making from the data to which she had access? If she had more data, would she be drawing the same conclusions? Were her espoused beliefs consistent with her own actions? What action strategies could she have engaged in to produce more effective consequences?

Management: Both approaches require the presence of a skilled facilitator though the skills used are different and in some instances might even be contradictory. In classic action learning the facilitator's role is clearly more passive than in action science. Revans conceived of the role as that of a "mirror" to merely illustrate conditions in the set in such a way that students can learn by themselves

and from each other. Action learning revisionists (Smith, 1988; Sutton, 1989) have suggested that the role of facilitator be elevated to that of a critical contributor of the overlooked P (programmed instruction) or of theory. P's role is to inform spontaneous inquiry and offer alternative frames of problems. Moreover, creative devices, such as synectics and counter-induction, can be introduced to stimulate group and individual problem exploration. Many standard group process techniques are available to advance the development of learning teams, resulting in improved functional efficiency and effectiveness (Raelin, 1993).

The amount of direct intervention taken by action learning facilitators will vary depending upon each facilitator's comfort level. The early proponents called for infinite patience in order to permit skills in insight and inquiry to develop. Naturally, some early modeling of active listening might be required. Facilitators, however, were not to forget the ultimate aim of action learning to make the learner the center of the experience.

One way to talk about facilitator differences is by referring to the level of inference used to diagnose and intervene in the respective technologies (Schwarz, 1994). Facilitators and group members need to make inferences since decisions often have to be reached without all the information being known or expressed. In action learning, facilitators tend to be content working at a low-level of inference. For example, if a group member named Jane talks about an inclination to avoid a co-worker because "he is discourteous," the facilitator might ask Jane to describe what this co-worker does that leads to the inference of discourteousness. An explanation is required in this instance since the team may decide that Jane 1) may need to work with this co-worker, 2) may need to identify what he does that implies discourteousness, and 3) if the behavior is indeed discourteous, how she can learn to either work around the co-worker or confront him to change the behavior. The inference in this case is considered to be low-level since a relatively

small amount of information is needed to clarify the behavior in question. Higher-level inferences tend to concern such issues as trust, power, and defensiveness. In these cases, a great deal of information is added to observable behavior to make the inference.

Action science facilitators, when given permission by members, will often probe into the defensive behavior undertaken by members. For instance, a salesperson named Jay complained that his two colleagues broke a trust built upon a "one for all" mentality which they had long agreed upon. When encouraged to explain what they did, he alleged that they were planning to "ace him out of a commission" on a joint endeavor. However, he admitted that he had no real evidence of this presumed plot. By engaging in an on-line simulation with some fellow team members who volunteered to play the part of his colleagues, Jay was able to work through his own fears of losing control in this three-way arrangement. His fear of a loss of trust was analyzed as his own defensive behavior arising from a feeling of vulnerability whenever he had to work closely with others.

Although action science facilitators would subscribe to the action learning precept that eventually the group assume the management of the experience, action science skills require more practice and development. It is difficult to learn how to surface inconsistencies between a participant's governing values and action strategies. Besides modeling, the facilitator needs to spend time actually teaching and demonstrating Model II learning skills. In working through individual and interpersonal problems, learners at times may have to reveal their defenses placing them at given moments in a personally vulnerable position. Facilitators thus need to be not only adequately trained but also quite active in helping the group member or members surface and deal with their feelings. Eventually, as the membership of the group gains confidence in using action science skills, learners can serve as co-facilitators and even begin to challenge the facilitator's action strategies. At this

point, the facilitator and the membership can transform themselves into a collaborative learning community.

Risk: No group experience is without some threat to individual members, but action science has the potential to subject participants to more personal threat than is the norm in such learning groups as action learning sets. Action science intervention is inevitably psychological since it often explores innermost feelings and emotional reactions, some of which are protected by fairly sophisticated personal defenses. As these defense mechanisms get broken down, members may feel vulnerable and exposed. Of course, they work through problems in the presence of a sensitive and well-trained facilitator as well as of caring group members. Moreover, the action science session is not therapeutic in the sense that it is work-based behavioral and interpersonal change that is sought as opposed to personality adjustment.

Action science participants often talk about the difficulty of leaving their group and having to face "the real world," both in between sessions and after the training if over. They long for an organizational culture which appreciates their hard work and which endorses double-loop learning as an organizational standard. It is unfortunately rare to find a management which collectively commits not only to acquiring and storing new knowledge but to interpreting it in a way that reveals organizational patterns, processes, and defensive routines. It is only in organizations with such a management that the risk of action science can be considered low yet sufficient to produce learning capable of responding to constant change.

Action learning subjects participants to a different level of risk which can again be characterized as instrumental. Normally, set members are working on a project in conjunction with learning team meetings. Although they are well-

advised throughout the process, they may end up working on a project which they cannot bring to a successful conclusion. In some instances, a project may fail due to circumstances beyond a member's control. In other instances, a participant may attempt a change effort that might be beyond the coping capacity of the organization. In either case, failure may imply incompetency leading to possible career derailment for the action learning participant. The personal risk described here can be overcome by organizational support which conceives of failure or suboptimal performance as an opportunity for organizational learning. Lack of management support can also seriously expose the participant. In one project, a commercial sales representative for a utility undertook a project to expand the company's economic development activity. Unfortunately, in the middle of the project, his supervisor was transferred. The new supervisor had little interest in the project and withdrew financial support. The project was scrapped leaving the participant both resentful about the company's commitment to change and anxious about his future internal career progression.

Assessment: As action research technologies, both action learning and action science share in an assessment which values learning of participants as an ultimate goal. Both also have a secondary objective of changing the organizational systems of the participants through more effective action by these same participants. Hence, both need to be evaluated against a meta-competency of learning to learn, such that the lessons of the training experience carry over to new and unique situations. As both technologies profess a learner-centered humanist philosophy, they also need to be evaluated against a standard of free consent.

A critical difference concerns the level of learning expected in each approach. Action learning primarily focuses on second-order learning. According to Bateson (1972), in first-order learning, we move from using pre-existing habitual responses

(zero-order learning) to learning about them. In second-order learning, we learn about contexts sufficiently to challenge the standard meanings underlying our responses. Accordingly, action learning helps participants learn to challenge the assumptions and meanings they use in planning and undertaking their project interventions. As they perfect their reflective skills, they tend to develop confidence in transferring their learning outside the project or group contexts.

Although some action learning facilitators risk moving their sets into third-order learning, it is undoubtedly an important province of action science. By third order learning, the very premises of tacit theories-in-use can be brought into question. It is learning about the "context of contexts" so that participants can hold a virtual reflective conversation with their situation. In this way, action science re-conceives our practice world in order to reveal the tacit processes that underlie our reasoning.

Action science intervention is more difficult to assess, for its effects can only be measured over the long run. Systemic change is likely to occur when a critical mass of organizational members begin to act in accordance with a Model II learning strategy. Action learning can bear nearly immediate results, at least in terms of finished and, in some instances, successful projects which can even impact the organization's "bottom line." The participants' learning orientation is also designed to be contagious as it spreads to new contexts and individuals. For example, a participant in one of our school's executive development programs, as part of his action learning project, designed a program to arrest the spread of an oral disease as part of his company's dental health program in the less developed countries. His commitment to involve multiple stakeholders in this endeavor was so effective as to constitute an eventual framework for launching other strategic initiatives. Throughout the planning process, however, there was not a great deal of attention paid to the possible negative consequences of using the company's

charity as a public relations ploy. Such a probe might well have ensued, however, under action science effectiveness criteria which would have sanctioned not only an examination of the project's underlying assumptions but the very governing values of its genesis and operation.

Conclusion

To those practitioners interested in humanistically-derived cognitive and behavioral change in organizations, there may not appear to be significant distinctions between the burgeoning action technologies in use today. All of these approaches share a passion for participant involvement in changes affecting them. They see knowledge not as a potential predictor of truth but as a tool to inform spontaneous action.

Nevertheless, at the point of implementation, these approaches may vary considerably in the impact they have on participants as well as on the organization or unit sponsoring the change. Hence, facilitators need to understand the philosophical assumptions underlying each approach. In this paper a number of distinctions have been drawn between action learning and action science, two of the most popular action technologies. These distinctions are further summarized in Table 1. Though both approaches are based on humanistic and action research principles, they vary considerably not only in their ultimate purpose but according to a number of philosophical processes, such as epistemology, ideology, and methodology. As both espouse the free consent of participants, OD facilitators need to understand these distinctions so that, as we suggested at the outset, they can forecast and illustrate for participants respective methods and likely effects. Facilitators also need to know their capabilities in using diverse methods. Those who may be experienced in both approaches also need to know whether and how

to shift gears in the midst of an intervention as they lead a group into a transition, say, from action learning to action science. One approach is not superior to the other so their adoption should be based on the choice and commitment of the change group's membership. As OD intervention strategies become more specialized, practitioners must become more skilled in their own theory and practice and more aware of diverse intervention effects.

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Table 1

Action Technology Criteria and
Distinctions Between Action Learning and Action Science

Criteria	Action Learning	Action Science
Philosophical Basis	Humanism and action research	Humanism and action research
Purpose	Behavioral change through reflection on real practices	Behavioral change through articulation of reasoning processes and improved public disclosure
Time Frame of Change	Short and mid-term	Long-term
Depth of Change	Interpersonal and instrumental	Interpersonal and intrapersonal
Epistemology	Placing theories into tacit experience	Making explicit tacit theories-in-use
Nature of Discourse	Rational, making meaning from experience	Emancipatory, exploring the premises of beliefs
Ideology	Arising from intrinsic natural learning processes within the group	Subscribing to particularistic double-loop learning concerned with elicitation of mental models
Methodology	Processing of there-and-then problems occurring within one's own work setting	Processing of here-and-now reasoning or of on-line interactions
Facilitator Role	Passive, functioning as mirror to expedite group processing	Active, demonstrating and orchestrating on-line Model II learning skills
Level of Inference	Low	High
Personal Risk	Political, peer dissatisfaction or career derailment resulting from poor project performance	Psychological, exposure of personal defenses and vulnerabilities
Organizational Risk	Moderate, needs top management and super-visory management support	Heavy, requires all management levels to expose their assumptions
Assessment	Project effectiveness, systemic change	Managerial effectiveness, systemic change
Learning Level	Second-order, challenging assumptions underlying practice interventions	Third-order, challenging premises underlying theories-in-use and underlying management's governing values