

BOOTSTRAPPING BEYOND MODEL I:  
A DESIGN FOR PROFESSIONAL SELF-RE-EDUCATION

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i. INTRODUCTION

i.i Some Background

Action science has attracted the reputation of being a kind of organizational alchemy; a deeply artful practice aimed at transforming individual and organizational behavioral patterns. Perhaps any theory-based practice complex enough to deal with the dynamics of organizational defensiveness would appear to require a degree of "artfulness" on the part of its practitioners. But a need for "artfulness" in complex intervention practice presents problems for professional education (Schön, 1983; Putnam, 1990), problems centering on the question: how would one develop the necessary "artfulness" to become competent in a complex practice? Perhaps reflecting this concern, Mike Halperin has echoed a worry whether action science can be "done safely unless you're Chris Argyris" (Halperin, 1992). Questions like these have brought us to wonder whether any account of deeply artful professional competence can be given. Donald Schön, one of the developers of the "Theory of Action" approach which is the foundation of action science, has suggested that consultants are confounded by their inability to explain the artful competence reflected in their practice--especially in terms traceable to their professional education (Schön, 1983). Such a difficulty to explain or account

for artful competence could be considered an obstacle to developing a theory of how we may acquire it.

Moreover, if action science is an artful practice, then on account of its own behavioral and non-intellectual basis for learning, the difficulties of becoming competent in action science on one's own (without the help of Argyris or his professional progeny) seem overwhelmingly intimidating. After all, a strong theoretical claim of the theory of action perspective is that we are most likely unaware of precisely how widely deviant our actions are from our espoused theory of behavior--how out of touch with our espoused values is our behavior. But it is just this knowledge of any mismatch between our actions and our espoused values that we must acquire to begin learning action science! So the question emerges: can a lone practitioner learn to put the concepts of action science to use in helping one's self and others to become more effective in organizational life?

This article is the account of my attempt to develop, through the help of colleagues, friends, family, and some personal counseling, a competence in action science artful enough to use effectively in organizational systems intervention. Let me hasten to say here that the preferred way of doing it is certainly to engage Argyris, or any of the other fine professionals who have developed this approach into such a powerful tool for organizational learning. But for many such an opportunity may appear out of reach.

i.ii About Action Science

Action science is the general name of a practice which conforms to a theory of action perspective (Argyris and Schön, 1974, 1978; Argyris, 1982; Argyris, Putnam, Smith, 1985) as it has developed through the work of Chris Argyris, Donald Schön, Diana Smith, Bob Putnam, and others. Action science accepts the notion that our behavior is an automatic device for error-correction informed by mental structures or models whose goals the behavior acts to approximate in real world conditions. The existence, structure, and decision-making logic of these mental models is something of which we are only dimly, if at all, aware.

In terms of organizational behavior, our unawareness of our own mental models--even though we behave in accord with them--can inhibit the development of a learning organization. This is because we often espouse a philosophy or general theory of action which others (though rarely ourselves) can plainly see is contradicted by our own behavior. This incongruence between what we say and what we do is hardly ever discussible in organizational settings; or if it is, the discussion or confrontation is often unproductive since it tends to exhibit precisely the same incongruence between values and behavior that is the catalyst of the confrontation.

The practice of doing action science is the conduct of a process through which one's self and other participants are held responsible for behavior which we come to recognize is inconsistent with values we espouse. During this process, through behavioral exercises, participants become aware of their

incongruent actions, witness their own defensive posturing, diagram the mental models informing this behavior, build new mental models with new goals, and learn to invent and produce new behaviors consistent with the new goals.

For action science behavior is the evidence, the empirical record, and the necessary vehicle for learning. This is because the learning is about why we behave the way we actually do in certain situations, and how we can come to behave differently. Stressful situations arise during the exercises, we behave in our usual fashion, and we allow ourselves to be caught on-line producing actions that characteristically inhibit organizational learning and adaptiveness. Through facing the dilemmas that arise in these situations new skills are developed in the form of behaviors more consistent with new organizational values we have come to hold.

Mere intellectual understanding of the new goals, the theory underlying action science, or a description of the transformed learning organization in behavioral terms, is radically insufficient for individuals to develop the ability to produce behavior consistent with the new goals and values. This leads to perhaps the most shocking prediction made by some action science practitioners: participants in action science interventions, embracing the new values, will espouse a Model II theory of action, will deny that they would violate those values; yet their actions will routinely violate the espoused norms, despite

participants beliefs they will not do so (Argyris, 1982; Argyris, Putnam, Smith, 1985).

#### i.iii What's Ahead

This account--a kind of personal odyssey--is divided into five sections. It begins with the recognition of an opportunity for integrating action science into some evolving areas of systems science for organizations. Part of my excitement on stumbling onto the theory of action approach was that it seemed to reflect--in its action-based learning theory--some important theoretical common ground with theories of learning that have arisen or become important in the systems field.

The second section sums up the dilemma facing prospective self-learners of action science: how can you learn something when you are very likely unaware, in any manner salient to the learning, of how your own behavior may obstruct the learning process?

Section three develops a strategy for breaking out of the double bind (for the self-educated practitioner), a strategy which distinguishes two types of learning. The first type, conceptual learning is recognized as radically insufficient for acquiring Model II action skills. Yet, a literature review seemed appropriate. The second type, action-based learning, is described and a template for such a process is adopted from the literature.

Section four focuses on how I dealt with my need to organize the concepts I had found in the literature in a logical manner.

This need led to my accidental development of a seminar covering the conceptual landscape of action science.

Section five gives an account of how one might address one's own mental models, with the help of family, friends, or personal counseling.

Section six provides an account of incremental progress in doing action science with organizations.

Section seven relates a self-evaluation of participants' behavioral changes during the course of an action science intervention.

#### 1. THE OPPORTUNITY

As graduate students we would often meet in a student pub to share our vexation with the impoverished state of organization science--if only those leading the field would read our papers, what a difference that would make! Our hubris was matched only by our enthusiasm for the subject, if not our respect for the complexities of conducting real-life interventions. During those sessions we often criticized certain methods of organizational analysis for the assumption that gathering data useful to the interventionist would present scant challenge. Since we knew to expect a wide range of rationalities (March, 1989) to be reflected in the data gathering process (interviews, for instance), we were at a loss to figure out how to understand them all without letting our own models of rationality cloud our judgment. Worse, we never thought to consider whether the espoused rationalities of actors

in organizations would perhaps *not* be reflected in their actual behavior. In short, the process of simply understanding a problematic situation in any way suggestive of resolving it seemed unmanageably complex.

Methodologists of systems science for organizations such as Robert Flood, Mike Jackson, and Werner Ulrich also have recognized that it is not at all clear how to proceed in complex and conflict-laden situations (Flood & Jackson, 1991; Ulrich, 1983). So, it appeared to all, theorists and students alike, that systems methodology for complex organizational problems is radically incomplete. This situation presents the interventionist with either a constraint or an opportunity: it is a constraint if we recognize no theory-based way of getting to the meat of the organizational problem, it is an opportunity if a method appears that can show a theory-based way to identify and gather salient data for complex, conflict-laden interventions.

At the same time, my work as a graduate student was to develop a description in cybernetic terms of Piaget's theory of learning (Dooley, 1993). Cybernetics is a technology of corrective behavior, and Piaget's theory of learning required action, in the form of corrective behavior, to achieve a goal, for instance, food (through the nipple) into one's mouth. If one's previous action smushed the nipple into one's cheek--a failure, then act now a little differently. Figure 1 shows a simple cybernetic control system.

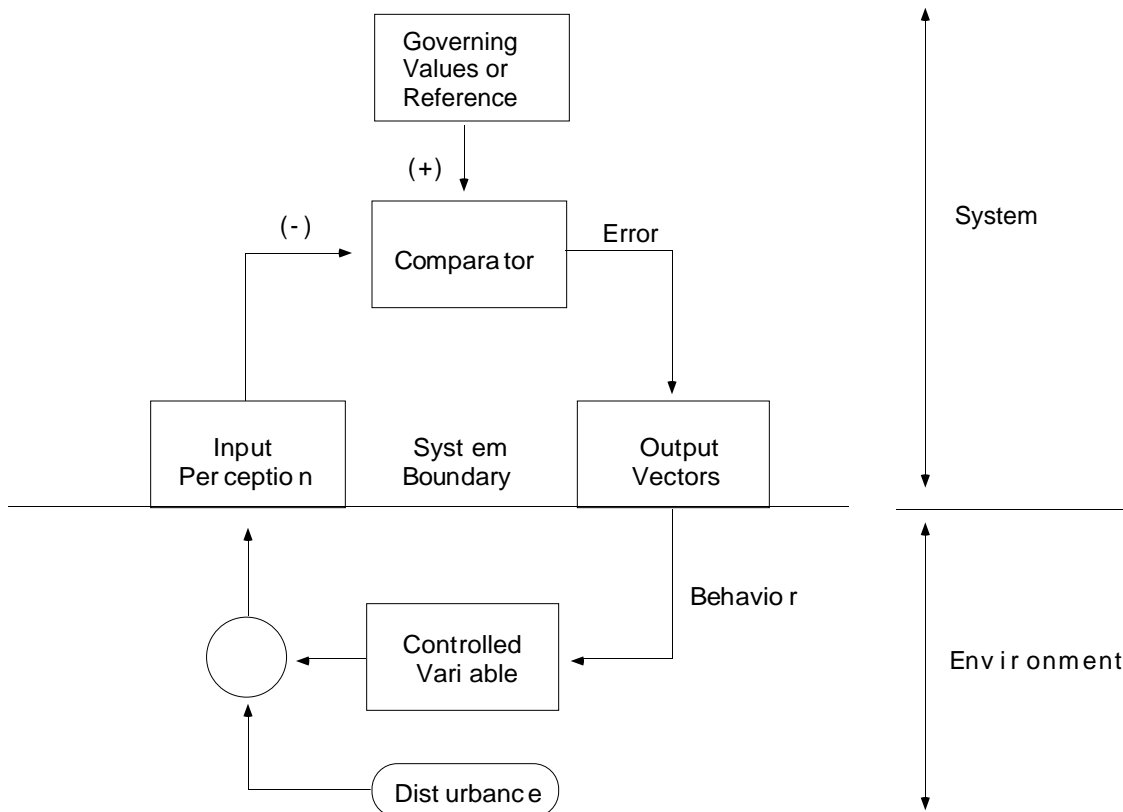


Figure 1

The diagram in Figure 1 represents a cybernetic system (Powers, 1973). The causal loop flows clockwise. A goal for action exists in the form of a governing value at the top. Prior actions plus environmental disturbances result in perceptions that either do or do not approach the observable condition specified by the goal. If the goal is not matched closely enough then behavior is triggered with the purpose of nudging perceived conditions to within the acceptable range of closeness to the goal condition. That would be a momentary, dynamic success. Corrective behavior in effective cybernetic systems is usually happening all the time in very small increments. That's because the systems are good at

keeping things very close to the goal state. For instance, when you drive a car on a straight road you can feel yourself making very small adjustments as the car tracks on the road, but someone watching from the passenger seat might not be able to "see" that you are "behaving" to make those very small adjustments. Yet, you are.

Piaget's notion of how we learn reflected the theoretical claim that we create little cybernetic systems of thought--mental models--through which our problem-solving behavior can be understood as corrective action (Dooley, 1993). The action or behavior is not a response to a remote stimulus, neither is it a random episode. Behavior, on Piaget's theory, is the action by which we get what we want. More important, behavior is the key to how we amass knowledge of our world, including ourselves. For the researcher, noting behavior points the way to understanding what's going on in the "mental" model. Here's how. If we grant that a cybernetic control system has a goal state that it seeks through behavior to approximate in the perceptual field, then we can immediately learn what the goal is by watching the observable condition that results from the system's sustained behavior (Powers, 1973). It's not quite as simple as that, but almost.

Action science follows this prescription by requiring that we infer the structure of a mental model from observing behavior, and from observing what conditions that behavior holds more or less constant in the organizational environment.

## 2. THE PROBLEM SITUATION

It seems possible that action science is an application of a Piagetian-style learning theory. Moreover, it seems as though it may be just such an application that we need to constructively address complex organization problems. But learning to do action science appears to require that we thoroughly investigate--and reorganize if necessary--our mental models. An aspect of the complexity of action science is, however, that we may not be aware of the state of our own mental models, through which our behavior is directed. If this is accurate, then how does the average OD professional--or the person on the street--learn to conduct this process through a program of self-designed learning?

## 3. THE STRATEGY

The first and most sensible idea that came up as I discussed the problem of learning action science with colleagues like Fred Roberts, a manager in Alameda County, California government, was that we should form a group and hire Diana Smith or Bob Putnam to fly out to San Francisco and teach it to us. We thought that an organized group would be able to pool resources and make such an idea financially feasible. But, as it turned out, there were only two of us in the group. Turning elsewhere, I looked around at local educational institutions and found no action science curriculum.

The alternative arose that we could help each other learn it ourselves, gradually replacing the default governing values of our

model I schemes with the more adaptive Model II goals. The two sets of goals are listed in Table 1 below.

Model I Values	Model II Values
Define and try to achieve goals	Facilitate valid information
Win, do not lose	Choices are free and informed
Suppress negative emotions	Self-responsibility for choice
Be rational	

Table 1: Model I and Model II Governing Values

The logic of this strategy reflected a simple cybernetic principle: if you change the governing goal or value of a control system then its behavior will begin to bring about conditions that approximate the new goal. This is because the effects of the system's behaviors (plus random disturbances) are measured by the system against its goal setting. If the system's goal setting changes, so does its behavior. Some systems are of an autonomous sort; they are responsible for their own goal settings. People are like this. Action science aims to create conditions within which actors evaluate and if necessary change their own "goal" settings. Our job, in this light, was to find out what our own goal settings were in certain situations, evaluate them, and replace them if necessary with ones more consistent with belonging to a learning organization. These goals are the ones found in the right hand column of Table 1. They are the governing values of a Model II theory of action.

It became clear that two types of learning were required if we were to learn action science among ourselves. First, to conduct a program with ourselves, it seemed necessary, though radically insufficient, for us to become familiar with the theory, the concepts, the jargon, and the methodology peculiar to action science. Second, it would be necessary to be the subject of an action science process, to do the hard work of being caught in our own counterproductive behavior and to learn to produce new, more effective behavior. By this time we were out of school and trying to bring these and other concepts to bear in our work. Fred and I continued our programs for learning action science more or less independently for a while.

For my part, I elected to learn the conceptual side of action science first because. . .well, it seemed the easier path. The literature was available and, in any case, it made sense to *understand* action science first before somehow learning how to do it.

### 3.1 The Literature Review

#### 3.1.1 *Theory in Practice* and *Organizational Learning*

Argyris and Schön's *Organizational Learning: A Theory of Action Perspective* was to be my introduction to action science. This 1978 work, I inferred from reading, extended the fundamental Theory of Action programme described in their 1974 *Theory in Practice*, to a relevance for wide-ranging organizational

diagnostics. *Organizational Learning* introduced action maps aimed at reflecting the dynamics of systemic dysfunction.

The book described how actors using Model I theories of action can create ambiguity and defensiveness in the workplace among interacting peers. These combined behaviors amount to what are called "Primary Inhibiting Loops." Such loops among individuals can be pernicious when they are not discussible. A typical example, taken from the text, describes an exchange between two actors for whom criteria for task assignment and division of responsibility were vague and ambiguous (Argyris, Schön, 1978, p. 54). This vagueness was not recognized and dealt with; instead the actors engaged in fancy footwork to avoid facing it which only served to heighten the severity of their dilemmas.

Beyond these more interpersonal dynamics, and reinforced by them, the book described systemic, "Secondary Inhibiting Loops." These include coalitions, group think, and so forth (Argyris, Schön, 1978, p. 109). Not only do these dynamics inhibit organizational learning, they reinforce themselves by virtue of the fact that they are designed to camouflage uncorrectable errors. This camouflage serves to maintain and reinforce the conditions within which the secondary inhibiting loops arise, and the cybernetic, causal loop is closed.

While I was growing increasingly enthusiastic at seeing the concepts of cybernetic systems applied to understanding organizational dysfunction, I was also frustrated and confused by the concepts and terminology. Since I'd not read the earlier

*Theory in Practice*, I still didn't understand the theoretical fundamentals. To that text I immediately turned.

*Theory in Practice* proved a concise exposition of, first, the theory, then the practice, finishing with some implications of a theory of action perspective for professional education and practice.

Plunging into "Part One: Theory" I found the notion of a Piagetian "scheme" mirrored as a "theory-in-use" (Argyris, Schön, 1974, p.8). Both the scheme and the theory-in-use are built up gradually, and they are progressively refined or reorganized through continued purposeful action. "Theories-in-use" are little behavioral "microtheories" that we develop for "every kind of situation" in which we find ourselves (p. 8). These microtheories are organized in hierarchies and can be grouped under very general meta theories-in-use. The implication here is that if we were to identify very general theories in use, then changing them might effect changes in many subordinate theories-in-use.

These theories of action are evaluated for their "tendencies" to either constrain or free individuals. The criteria for evaluating them are exhibited in five questions: (1) are they internally consistent? (2) are our espoused theories of action congruent with the ones reflected in our behavior? (3) are our theories of action effective--do they further our short-run and long-run aims? (4) are they testable--do they effect the error-correcting action we ask of them, or do we delude ourselves that they work when they may not? (5) do we value the behavioral world

that results from the actions that flow from our theories-in-use? (pp. 20-28).

Honest, searching answers to these questions, so far as we are capable of examining our theories of action, may give us insight into the structure of our mental models.

Perhaps the single greatest value for me in *Theory in Practice* was the systematic exposition of the high-level theories-of-action Argyris and Schön have labeled "Model I" and "Model II" (Chapters 4 and 5). They conjecture that people generally are programmed with Model I as a default theory of action, or, in a more general sense, a default mental model. A description of the governing values, action strategies, behavioral consequences, and learning consequences of these theories of action, and the contrasts between them, are well published (Argyris, Schön, 1974; Argyris, 1982; Argyris, Putnam, Smith, 1985).

However, one point of differentiation between Model I and Model II that is worth mentioning is that their respective theories of action tend to maintain different types of organizational learning. Model I theories of action tend to facilitate a limited kind of learning that Argyris and Schön (1974, pp. 18-19) describe as "single-loop learning." Alternately, Model II theories of action tend to facilitate a wider, deeper kind of learning they identify as "double-loop learning." The two types of learning are mapped in Figure 2 below. Single-loop learning fosters behavior that reflects values which are accepted as given; double-loop learning is more complex

insofar as the values that drive the actions are themselves subject to inquiry.

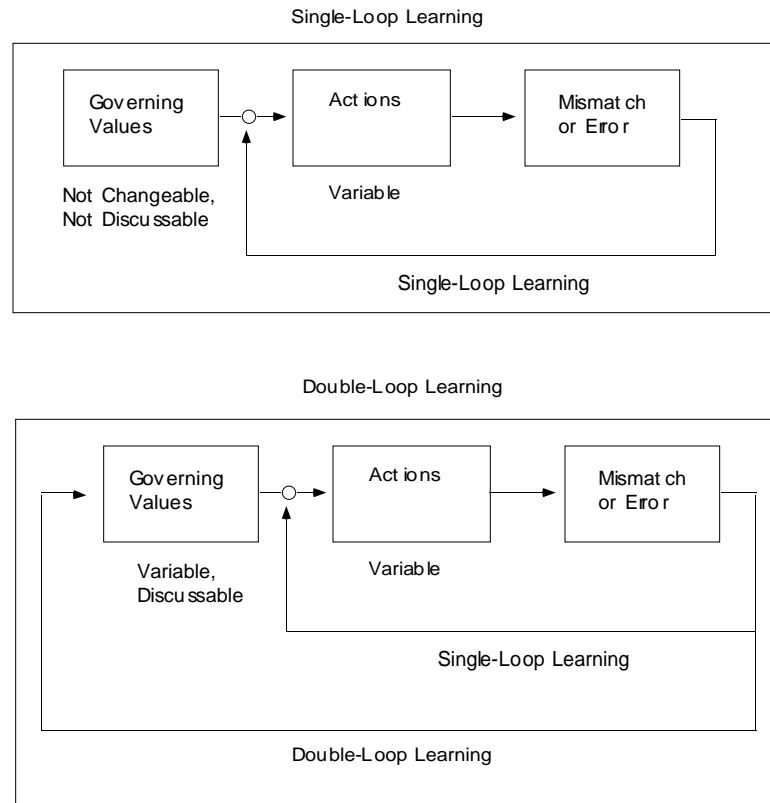
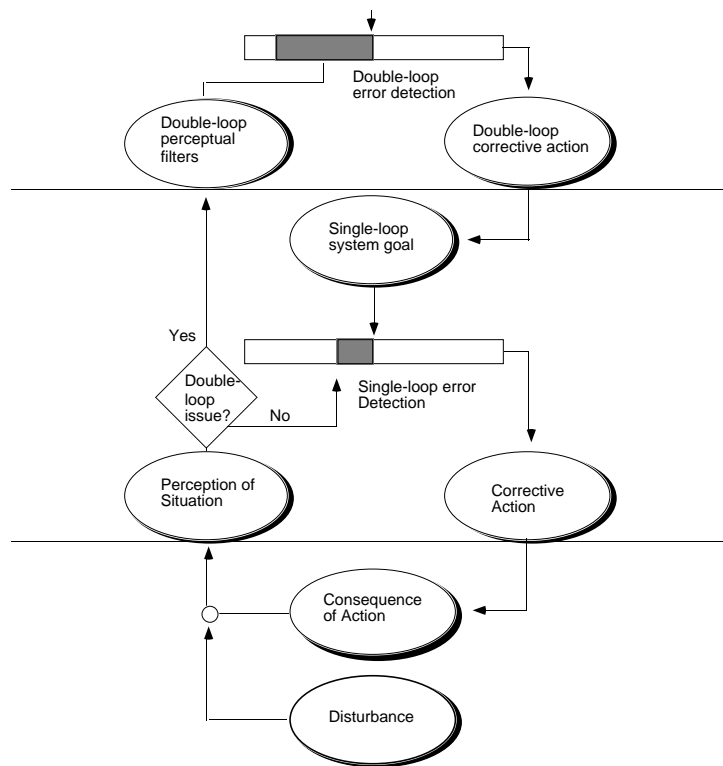


Figure 2. (Adapted from Argyris, 1990)

Argyris and Schön observe, for instance, that the suppression of conflict in organizational settings is symptomatic of single loop learning. The behavioral values embedded in the organization that may have led to the conflict in the first place are not discussable—the conflict is simply forcibly suppressed. In contrast, double-loop learning might help direct inquiry into the behavioral values of the organization that reinforce combative posturing and conflict. It is important to note that single-loop learning has its place in organizational life, but that adaptive

organizations also are able to enact double-loop inquiry when problems are complex.

I began to realize that a key skill to be developed in the course of an action science program would be to help participants learn to know when to act in single loop-learning mode and when to shift gears and go into double-loop learning mode. I diagrammed this function in Figure 3. Note that there is a decision gate within the single loop system which monitors perceptions and triggers double-loop inquiry at the appropriate signals. How to recognize these signals and what to do to trigger double-loop inquiry are among the abilities participants in action science interventions are likely to develop.



### Figure 3

#### Developing a Double-Loop Learning Gate

I've overheard some OD professionals argue that action science is really an approach to understanding and altering the behavior of individuals, and that it has little relevance for group effectiveness. Indeed, *Theory in Practice* reflects a focus on individual mental models and how they may be inferred, surfaced, understood, and gradually transformed. But a systems view of organizational behavior looks at individuals as complex wholes who, by their relations in the organization, make up a single complex whole on a meta-level, that of the organization. It would make sense, from a systems perspective, for individual behaviors to combine in powerful patterns across the organization, patterns that would exhibit dynamic causal properties not seen on the individual level (Argyris, 1993). It was, it appeared, the thesis of the later *Organizational Learning* text from Argyris and Schön (1978), that dysfunctional organizational patterns could be explained and ameliorated through an action science learning process. Building upon the templates of Model I and Model II, they introduce in *Organizational Learning*, Model O-I and Model O-II. The "O" stands for Organization. These are mental models of the organization, through which organizational behavior patterns may be explained.

#### 3.1.2 Action Science

Half way through *Action Science* I began to appreciate what Argyris and his associates were trying to do: provide an account of the learning process in terms of the small steps that together amount to the overhaul of our mental models and the behavior they inform. Actually, *Action Science* is more; it is an elucidation of the theory and a critique of traditional social science in which the experimenter remains aloof from the experiment. Throughout Part Three: "Developing Skills for Useful Research and Effective Intervention," Argyris, Putnam, and Smith emphasize how much a part of the experiment is the experimenter. They declare, "The aim of action science is to serve participants' learning and to enable them to change by virtue of the researchers' influence" (pp. 260-261).

This declaration frames the role of the interventionist as a real-time, on-line participant, one who is *expected* to play an active role in the experiment. The interventionist, however, possesses skills, namely Model II skills for conducting double-loop inquiry, that are likely to be scarcely found throughout the rest of the group. The interventionist must use these skills for two reasons: first, the interventionist becomes a behavioral example for the participants to emulate during the process; second, it is a normative goal in the practice of action science that the practitioner's behavior must be congruent with the governing values of Model II. This requires that the practitioner avoid any form of coercion or unilateral control of participants, even under the guise that it is in participants' best interest to

be coerced. The paradox reflected in this apparent double bind for the practitioner is: how to bring about free and informed consent of participants to overhaul their own mental models when their routine (defensive) behavior inhibits recognition of a need to do so?

Part Three of *Action Science* is the road map of an escape route from this paradox. It is the account of a year-long intervention during which participants first were shocked to see how they acted in violation of their own espoused values, how they learned to understand and map their mental models and the causal chains of behavior maintaining those models, and finally how they gradually became able to invent and produce new behaviors consistent with Model II values. The book is a template for designing an action science intervention. When it later became my task to design an extended action science learning project, I used Part Three of *Action Science* as my primary structure checklist and methodological guide.

#### 4. SUMMARIZING THE CONCEPTUAL LANDSCAPE

The magnitude of the action science literature made remembering and organizing the concepts a complex task, impossible for me to do without distilling it out into some sort of an outline. Once I'd studied, in addition to the above works, Argyris's *Reasoning, Learning, and Action* (1982) and *Overcoming Organizational Defenses* (1990) and Putnam's doctoral dissertation, "Putting Concepts to Use: Re-Educating Professionals for

Organizational Learning," I turned to organizing the conceptual landscape of action science in a way that would serve two purposes: first, to enable me to pack into an outline form the theory, methodology, and logic of practice; second, to produce a presentation that, when delivered in a more or less action science manner (interactive, open to confrontation), would illustrate to an audience the problems action science addresses, how it addresses them, and what actors can expect from participating in an action science intervention.

I was comfortable giving the presentation, and it became easy, smooth, and fun to do. People were interested in learning about the approach. But meanwhile, I was also aware that, despite my comfort with the conceptual framework, I was frightened and intimidated at the thought of conducting the learning phase. The fear was simply a reflection of my knowledge that, despite my relative command of the conceptual landscape, I was predictably enough, still a behavioral exemplar of Model I or at best a hybrid of Model I and Model II. I needed to do a lot of unfreezing of my own mental models and their resultant behavioral consequences before I could help others do it.

## 5. HOMEWORK

During and before the period in which I'd become immersed in the Theory of Action perspective my wife and I had visited a private counselor. We came out of that process with the belief that what may seem to be the fact of the matter to one may not

seem so to the other, and, to complicate, there was no way of checking for absolute facthood, especially of highly abstract attributions. Yet, we learned to respect the provisional hypotheses of one another, learning to inquire into how each may have come to hold particular views. This was real progress because it meant that one had to learn to avoid framing inquiry in such a way as to protect one's own hypotheses from risk, and that one had to sincerely accept the perpetual possibility that one might be wrong. My wife and I practiced this way of respecting the other's views slowly and falteringly. We often thought about each word as we spoke it, producing new behaviors with agonizingly neophyte competence. We had to give up the cherished notion that, as individuals, we were always right.

My own learning through the counseling was that I had always suppressed feelings and was expert at the fancy footwork required to keep the feelings buried while decoying inquiry elsewhere. The counseling helped me to be more aware of my own feelings and to find appropriate ways to let them show. I was able to see that much of my Model I behavior was a direct result of the fakery that one produces in the act of suppressing one's feelings.

During this process, which has continued as a practice of ours upon one another, we gradually gained some skill in putting our own ideas aside with minimal defensiveness, then advocating them with inquiry so that our hypotheses may be tested. We learned to cite observable data when sharing attributions. We continued to catch ourselves trying to exert unilateral control,

to persuade one another with a stronger argument. We eased in, advocating a position we would not openly confess, or, if questioned, would deny. It was and remains very slow going. Occasionally, seeing the possibility of a transformed reality, we would surface long-cherished and secret, powerful defensive routines. Once the defensive routines were surfaced they could no longer be used. This was frightening but also exhilarating; we understood that we were learning to double-loop learn.

## 6. DOING ACTION SCIENCE

### 6.1 Helping One's Self While Helping Others

Bob Putnam, at the beginning of his doctoral dissertation, asks, "how does a practitioner learn to put concepts to use in order to become skillful in a new theory of practice, when the intention is also to help others learn?" (1990) The focus of action science is to help others learn, but further, to help them do so through behavior--the educator's--consistent with the reality to be achieved. To fulfill this last requirement practitioners of action science must learn to behave consistently with their espoused values and ideals before setting out to re-educate others. The question looms for the practitioner: how much personal learning is enough to qualify one to begin work with others? It is an especially important question when one is purportedly learning action science without the aid of its developers or seasoned practitioners. This was my predicament.

### 6.2 I Gave a Seminar and Action Science Broke Out

For the would-be practitioner, the prospect of conducting seminars *about* action science--explaining it as much as is possible without necessarily doing it--seems very much safer and less intimidating than mounting a full-scale learning intervention. This was my reason for learning the conceptual landscape and then fashioning a seminar around it as a part of my initial learning. But something unexpected consistently arose during the two-days of the conceptual seminar: participants would

begin to experiment with the concepts on-line during the seminar to deal with actual organization problems.

These episodes were startling, illuminating, frightening, and wonderful. Double-loop learning issues would arise in these episodes and participants could be observed "giving reason" and inquiring into sensitive areas that would normally be undiscussable. For instance, at one point during a conceptual seminar a participant whom we'll name Mark surfaced the fear that "all this consultation and interest about how we interact here [in the organization] could slow us down enough to make us really ineffective--if we have to think about everything we do." This question opens up to critical evaluation the programme itself through which the organization is examining the theory of action perspective. Management, which had initiated the consultation, could have reacted to this query in a defensive manner, attributing Mark with an attitude of "not being with the program," or something similar while not surfacing or illustrating the attribution in a manner conducive to double-loop learning. Instead, management allowed the dialogue to focus on whether or not organizational effectiveness consulting may be harmful to the organization. Hypotheses were shared and tested, and Mark agreed at the end of the session that his concerns were addressed in a way that involved valid information, free and informed consent to continuing, and self-responsibility of participants for designing the new, learning organization. These conditions reflected the

governing values of the Model II theories of action that the conceptual seminar was designed to explain.

I began to understand that the separation of talking about action science from actually doing it may, like most dichotomies, be a false and ungainly distinction. It also occurred to me that I had been the one to introduce the dichotomy as a function of my lack of confidence in my ability to facilitate the substantive learning phase. Taking these concerns to heart was difficult; I continued to respond (in my internal dialogue) with good reasons for making, at least initially, the separation of concept from learning. These reasons were simply that for one to give free and informed consent and feel self-responsibility for adopting a learning program, one had to have reasons for doing so based on valid information. This valid information comes in the form of a logical exposition of the concepts, theory, and methodology of action science. If the conceptual layout seems to fit a situation, then it may be useful to consider engaging the learning phase. Now if the concepts are presented in terms of real organizational problems, then the concepts will likely be more starkly and memorably illustrated, and moreover, some attempts at double-loop learning may take place.

For me, as an aspiring facilitator of action science interventions, the unexpected shifting of focus in the conceptual seminar from teaching about action science to doing it, fulfilled a crucial need: to help me to see that I could facilitate such a process, on-line, among participants who intended to but were

unable to produce Model II and, moreover, who were unaware of this inability. I was witnessing action science being done: undiscussables were being surfaced, attributions were being examined and illustrated (when prompted for illustration), inquiry was directed at the facilitator's actions, people were being held responsible for their actions in ways that brought their defensive routines under scrutiny. There was a general feeling of excitement that issues were being addressed that could not have been addressed under normal organizational circumstances because of powerful and pernicious primary and secondary inhibiting loops (Argyris and Schön, 1978).

### 6.3 The Learning Phase of an Action Science Intervention

My initial design for the learning phase intervention closely followed "Part Three" of *Action Science*. I separated the program into three parts: (1) unfreezing, by which participants become aware that their behavior violates their own espoused norms and those of the organization; (2) mapping their mental models and the looping causal, behavioral patterns they establish within the organization; and (3) internalizing new mental models and the behavioral strategies which result in action that encourages individual and organizational learning and adaptiveness.

Participants begin by setting their own ground rules for the intervention. One of these I suggest up front for consideration by the group: attendance is completely voluntary. Fruitful areas of inquiry into organization problems may be reflected as the

group sets additional ground rules. For instance, participants may wonder how to deal with a situation in which a participant feels unable to continue a session.

It was through conducting the learning phase that I glimpsed the importance of art and creativity to effective practice. During the unfreezing phase of a learning intervention I was surprised to observe that participants, role-playing their consultation on a test case (XY case, Argyris, 1982) could not see that their evaluation of and advice to Y was delivered in a manner precisely in violation of the advice they were then giving. After one participant had gone twice through the role-play without seeing it I asked if I could role-play his part while he role-played Y. I asked that the participant monitor his feelings as I advised and evaluated him, using his own words. Once the role-play was finished the participant acknowledged that at certain points (unillustrated attributions, and advocacy without inquiry, mostly) he felt defensive and angry with me. He understood perfectly well that he was reacting to his own productions and this was what finally drove a wedge of insight for this participant into the limited effectiveness of his own behavior. As this procedure was repeated with a few other participants more awareness (unfreezing) followed. Repeatedly, participants commented that a consequence of their defensive reactions was that they would be distracted from the content of the advice by their feelings and would mentally withdraw from the advice session. This was a consequence that the behavior they had produced, with

intentions to help, created in themselves once it was turned upon them. Their sudden awareness of this sharpened the clarity with which they began to understand their own responsibility for unsatisfactory episodes.

In another intervention this same procedure helped a manager understand for the first time how she was contributing to a subordinate's aggressiveness and defiance through her own defensiveness.

This heuristic and others like it seem related to the "Argyrisms" Putnam cites (Putnam, 1990). These are verbal recipes or procedures for opening opportunities for double-loop learning. One such "Argyris" is: "what prevents you from. . . ." Another might be: "If you are unwilling to illustrate your attribution of me, I am not likely to learn how it is that you are right and you are not likely to learn how it may be that you are wrong" (Argyris, 1990)

To facilitate adaptiveness in others one must first be adaptive. A consequence of this requirement is that one become reconciled with the heavy use of heuristics in on-line situations. Sometimes these heuristics are invented and produced on-line themselves. This activity comes closest to what I have come to understand as the art in the practice. Borrowing a phrase attributed to Norman Packard and Chris Langton (Kauffman, 1993), the practitioner must become situated at the "edge of chaos." This means that the practitioner must be very open to reorganization (the chaotic regime), yet maintain a certain

purpose or defining characteristic (the ordered regime). Too far into the ordered regime and the practitioner cannot adapt at all and pathological rigidity is the result; too far in the chaotic regime and the practitioner cannot maintain any identity or overall purpose. The edge of chaos allows the practitioner maximum adaptiveness and creativity while keeping his or her basic identity and purpose as the interventionist. For an action science practitioner the edge of chaos is a realm of heuristics, not algorithms.

#### 7. CRITIQUE OF AN ACTION SCIENCE PRACTICE

A norm of action science is that it be subjected to the same criteria of inquiry that it requires of participants in its programs. If this is the case, we can consider such inquiry a meta-level inquiry. Actually, we can present a model of inquiry that focuses on at least two hierarchical levels, or logical recursions. First, there is the level of inquiry on which the interventionist directs Model II inquiry into participants' behavior and underlying mental models. On this same level the interventionist's behavior is subjected to identical scrutiny according to the values and methods prescribed by Model II theory of action. Leaping up a recursion, we find the logical realm of inquiry into the theory and methodology of action science itself. However, during an action science intervention one can and should expect inquiry to focus on either or both levels at any time. Critique, then, is applied across the board in a practical sense,

at both the application of action science and the theory of action perspective at the same time. The circularity in this is not pernicious; it is a way of letting science learn from and evaluate itself in terms of the human problems it addresses (Dewey, 1938).

This critique, however, is aimed more at a learning intervention I conducted, to help understand my own degree of competence at doing action science. The intervention began with twelve participants, all of whom had voluntarily attended the conceptual seminar. During the course of a six-month intervention two participants elected not to continue for a period, then later rejoined the group.

This intervention was designed as a part of a larger structural intervention initiated and conducted, at first internally, by the management of the organization. Once under way, that intervention was passed to an outside consultant to help define new structures, roles, work team assignments, and so forth, to help develop a learning organization. A key goal of this structural intervention was the empowerment of organization members. My action science program was designed to enhance the effectiveness of this intervention by focusing on the behavioral dynamics of the organization and its members. This focus reflected another goal management had set for the intervention: to overcome what had come to be called the "organizational defensive pattern(s)" or ODP (Argyris, 1990). The structural consultant's approach was to help create conditions within which empowerment may emerge; this approach he called "pulling." In contrast, my

part was to facilitate an overhaul where necessary of participants' mental models and the behaviors--individual and organizational--that these models informed. This approach we called "pushing." The overall intervention--both parts--was designed to pull and push just the right amounts to facilitate an effective, timely, and durable transformation of the organization. This way structural changes would take place in two places at once: First, the organization would be restructured to better achieve its mission and become empowered in the process; second, the mental models of the individuals and the organization would be restructured for the development adaptive learning skills.

One audit function of the combined intervention was to evaluate my action science program. This evaluation was conducted in my absence at a point nearly two-thirds through the intervention. Participants were asked to respond with a value on a scale of 1 to 10 (10 = most effective): (1) How effective was your behavior when you dealt with double-loop learning issues prior to your experience in the action science program? (2) How effective is your behavior dealing with double-loop issues now?

Table 2 shows the self-assigned evaluation of participants' behavioral effectiveness before and two-thirds through the action science intervention. The mean value of the left column is 3.8, while the mean value of the right column is 6.7. Taken together this way, the ten participants have attributed themselves a near doubling of behavioral effectiveness in dealing with double-loop learning issues.

Prior Effectiveness                      Current Effectiveness

Actor 1	2	7
Actor 2	4	8
Actor 3	5	7
Actor 4	5	7
Actor 5	3	6
Actor 6	5	7
Actor 7	4	6
Actor 8	3	5
Actor 9	3	6
Actor 10	4	8

Table 2

An additional evaluation instrument, suggesting the extent participants had internalized Model II governing values from case episodes and from reflective talk (Putnam, 1990) would provide a more comprehensive and rigorous reading, but participants' own judgments about the increased effectiveness of their behavior during the action science intervention contributes to a not unfavorable reflection on the intervention.

Early in that intervention, however, my own behavior was questioned by a participant, and we agreed after a period of inquiry that I had acted in ways incongruent with Model II values. What I had done was lapse into a default teaching mode--seeking

through extended monologues to illuminate the concepts were were learning to put to use.

The participant told me that he thought I had acted contrary to the values we were learning during certain episodes. He illustrated the attribution that my behavior was out of phase with Model II with paraphrases of my own words in context. He asked me what I thought. I understood, with his help, how my behavior during the episodes was a default production of my Model I theory of action. I had launched the one-way teaching behavior under the governing values "set goals and try to achieve them," and "win, do not lose." These goals led me to believe that I knew what the participants needed to know, that it was my job to teach them, and that a unilateral action of mine upon the participants was necessary for the learning to happen. I had somehow not recognized that this strategy goes against everything I had been advocating about acquiring knowledge in general, and against a norm of action science. In short, I was unaware that my behavior was a reflection of a Model I theory of action. Sadly, I produced this behavior while purportedly acting as a Model II exemplar.

I found the episode embarrassing and bewildering in two ways, (1) I'd been incompetent in a situation in which competence is very important, and (2) I was alarmed that I could have so blatantly violated the values I espoused. I worried about this episode for a few weeks, comforted somewhat by Argyris's comment somewhere in the literature to the effect, "the interventionist can make mistakes; just not a lot of mistakes."

The result of the episode was that I learned, through a Model II intervention--that of the participant--that participants *would* hold me responsible for my behavior, and that a mistake is to be viewed, however embarrassing, as a welcome chance for insight into our mental models and the behavior they inform. In this way the interventionist is a learner, too, during an intervention.

## 8. CONCLUSION

Piaget has written that knowledge is accumulated through behavior. The developers of action science have applied this maxim to the field of organizational diagnosis and learning. An interpretive, heuristic-oriented practice like that of action science seems to require a degree of artfulness to be optimally effective. Yet, the question occurs, how is it that practitioners can develop the artfulness--a very special kind of knowledge--required to do the practice, if, according to the theory, they can only develop it through doing the practice? How, especially, can one develop competence in action science through self-designed re-education, when precisely what one must know to do the learning is something of which one is most likely unaware?

The escape from this dilemma is an incremental one, involving for me a commitment to (1) a literature review to internalize the theory, logic, and methodology of action science; and (2) work with others--family and private counseling--to provoke my own unfreezing, so far as this has been achieved. The dialectic between the conceptual learning and the behavioral learning was

beneficial for the learning project; one phase illuminated the other and vice versa. A result of this process can be reflected in one's increasing ability to initiate double-loop inquiry where it is appropriate.

The bulk of the literature seemed to require a distillation or outline summary of the concepts in a way that reflected the logic of the theory and the methodology. This outline grew into a presentation of the conceptual landscape of action science, and the presentation--actually, a two-day workshop--was moderately successful at explaining what action science is, how it is conducted, and what one could expect from it.

The prospect of conducting the actual learning phase of an action science program loomed intimidating to me. I feared that I would have no way of knowing whether I would intervene to help or hinder organizational learning. An intervention was designed to rebuild structures on two levels at once: first, to restructure the organization, and second, to rebuild the mental models informing the theories of action in use by individuals. The overall aim was to create an empowered organization as free as possible from organizational defensive patterns. Two consultants, myself and another, worked with the organization to push and pull at the same time. There was some evidence, generated by participants in the action science program as they reflected on the relative effectiveness of their behavior in double-loop learning situations, that, during the course of the program, their ability to produce effective behavior increased.

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