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BEYOND COMPETENCE:  
PREPARING FOR TECHNOLOGICAL CHANGE  
by  
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Confronted by an increasing pace of technological change, many recognize the crucial role of training to help us meet these challenges. A recent editorial, for example, in a major paper features this warning: "Training workers for the new jobs" is the new priority; the needed jobs exist, and the unemployed are available--but there is a "mismatch" between the skills which are needed and those which many unemployed can offer.<sup>1</sup> The Federal Government of Canada is among those who take these warnings seriously: It has recently proposed the diverting of unemployment insurance funds to help pay for worker training.

But what exactly is "training"--this process of preparation--on which we are placing so much faith? And what does it accomplish? My claim in this paper is that what we call "training" and what we call "education" are really two poles of a single continuum--of a unifying process which could be called "preparation." Education which fails to impart the competence-levels expected from training loses its connection with people's lived concerns; it becomes remote and artificial. Yet, simple training

without education does not prepare one for the changes, the decision-making, and the unexpected which are at the heart of life. It too is artificial, because it focuses on arbitrarily fixed tasks. For success in our increasingly technological and changing environment, mere competence in particular skills is rarely a sufficient preparation.

Traditionally, the philosophy of education has concentrated on only the "education" side of this process: How do we produce what Peters would call "the educated man"? Though acknowledged as necessary for imparting job skills, perhaps, or as an enrichment to the education process (as in Dewey's use of manual training in the schools), training itself has rarely been considered an object for philosophical study. This means that the job of understanding and developing training concepts has fallen almost totally to the pragmatists and entrepreneurs who actually devise and offer new courses, training materials, and techniques. This, I would argue, is not without dangers, because, in spite of obvious successes in technology and method by these professional trainers, there are also some important weaknesses in their usual assumptions. My goal in these pages is to begin substantiating this claim, and to suggest some lines for future research.

Training, I have suggested, must be linked with education if the outcomes are to be effective for actual roles in society. This is not to deny, of course, that

training and education can be meaningfully distinguished. As usually defined, "training" prepares for tasks whose desired outcomes can be specified precisely in advance. I can train to shoot a target, for example.<sup>2</sup> One is "competent" when one can dependably execute these trained-for tasks. "Education," on the other hand, appears to provide facility for creative and decisive thought. We cannot say exactly in advance what decisions will be made or what will be created by the educated person. True education, for example, should not be expected to produce all Conservatives or all Liberals; if it did, then the process would be really a type of persuasion or brainwashing. Instead, each voter who is educated should be in a position, based on his or her own circumstances and research, to make an informed and intelligent choice among the parties.

In practice, however, no goal is so precisely delimitable as to require only training--or only education--to prepare for it. Even the target shooter may have to adjust, in game conditions, to unexpected factors--ranging from crowd pressures, to the effects of wind and temperature. Somehow, he or she must be prepared to make compensatory decisions--even though these effects may never have been encountered in training, or, correspondingly, measured in classroom testing of his or her competence. This is even more significant regarding the career and industrial training which is now so

popular. Technology and career requirements are changing at unprecedented rates. The individuals who are best prepared do not just know the facts and procedures which are laid out in today's texts; they can also continue learning and adapt creatively to change. If necessary, moreover, they can modify or critique their actions, in response to social, environmental or moral concerns. Just these capacities, I claim, are the goals of "education."

Whereas John Dewey and others have acknowledged some role for training in a balanced education, my present focus is on the role for education to balance training, itself. In effect, my arguments are complementary to what Donald Schon has put forward in his recent Educating the Reflective Practitioner. (Schon 1987) Schon argues that today's professional schools--with their academic and "scientific" orientations--fail to prepare their graduates adequately for real-world practice. My corresponding argument, on the other hand, is that trade schools, and other trainers who focus too exclusively on competence in "practical skills", rather than theory, are likewise missing the mark. As Schon has recognized, some blending of the two approaches is required. Perhaps, for example, they can both be incorporated in the three-aimed sort of education envisioned by Mortimer Adler: acquisition of organized knowledge by means of didactic instruction and lectures (which could include alternative methods such as Computer Based Learning delivery of content); acquisition

of skills by means of coaching and supervised practice; and acquisition of enlarged understanding by means of Socratic questioning and active participation. (Adler 1982: 23)

As I indicated, training has tended to be ignored--or even disdained--as a subject for serious inquiry by traditional philosophers of education. R.S. Peters, for example, described education in his Ethics and Education as "the initiation of the young into a worthwhile form of life." The school, he suggests, shares with churches and synagogues the role of "preserving and transmitting the ultimate values of society"--including a body of knowledge plus "the principles of procedure and forms of thought that enable such a body of knowledge to develop and to be adapted to new circumstances." (Peters 1966: 252)

"Training" is included in Peter's vision only with reluctance. Ancient Athenian citizens could rely on slaves to perform their "menial and instrumental tasks"--so necessary for perpetuating society. Because modern citizens lack this convenience, the school takes on, as an additional, instrumental function, the training and selecting of people to perform those menial tasks. How this is to be accomplished does not concern Peters, provided his schools manage to offer, as well, an education in his own sense.

The philosopher Socrates, who, one might say, was one of those "Athenian citizens," reveals a similar disinterest in training, according to Plato's Meno. There, he

expresses surprise that the good man Themistocles would impart first-class training to his son in horsemanship and similar arts, while appearing unable (though surely willing) to "train" him likewise in the virtues of goodness and wisdom. (Meno 93d-e) Clearly, the goals of "teaching virtue" are valued more highly by Socrates than the goals of "training in horsemanship"; this ranking is not in dispute. But note Socrates' assumption: He assumes that in parallel with the ranking of these training goals, the process of attaining horsemanship skills can likewise be discounted as more easy to accomplish than the process of attaining virtue.

This Socratic assumption, I believe, cannot be fully defended, and certainly, it cannot be taken for granted. It is easy to show that training successes can be just as difficult to come by as "education" successes. Indeed, Socrates himself admits that the son of Themistocles happened to emerge from his training as a recognized master of horsemanship. Yet surely there were other parents in the community who equally lavished horsemanship-training on their own children--yet none of these trainees showed outstanding results. At best, these other sons may have exhibited competence, but not necessarily excellence.

My point is that perhaps Socrates dismissed the importance and difficulty of training prematurely. It has been suggested that perhaps Socrates was really asking in the Meno who are the recognized masters of virtue. The

masters of horsemanship can be readily identified because the tasks that mark their successes are well defined. Yet, on inspection, all the reputed masters of virtue, such as the Sophists, turn out to lack the knowledge (of what virtue is) and the method (that is, the Socratic method) for demonstrating and teaching their reputed wisdom.<sup>3</sup>

This observation does reveal something important: The marks of training-success are definitely more obvious than the marks of education-success. Yet, for neither type of expert, is the transmission of their expertise a matter of certainty. And part of the reason for this is that real-world expertise requires both training and education success, not just one or the other.

But if it is true that most philosophers have not thought much about training--that is, training as an end--there is a good explanation for this.<sup>4</sup> The reason for overlooking training difficulties is this: Training-success, like shoe-making success, seems indisputably an empirical affair. How does one judge success in shoe-making? One tests how comfortable the shoes actually feel, and how well they wear; no arguments of logic or ethics are required. It might appear that training-success should be judged similarly: Simply observe the skilfulness that the training technique actually imparts to the trainees. If "rules of thumb" (like having boxers-in-training skip ropes) work, then objections based on "theoretical" grounds appear out of

place. Among the many writers who have adopted such a view are Charles Brauner and Paul Weiss.<sup>5</sup>

The trouble with this attractive argument, however, is that the links between presumed training-activities and resulting skills are often much less straightforward than those in such building activities as shoe making. A qualified podiatrist, perhaps, could explain the link between shoe design and the wearer's comfort. But what is the training link that explains the "superstar" quality of a Wayne Gretzky's hockey performance? Or why could not the Americans, in the 1940's and 1950's, identify that elusive "training method" that (the sports writers of the day insisted) was "enabling" the Europeans to keep beating them in endurance racing? (Fads of adopting the Swedish fartlek method of variable speed running, and then, when that failed, "interval training" techniques, all proved unsuccessful; while, in point of fact, the three greatest marathoners of the era, Arthur Lydiard, Percy Cerutti, and Woldemar Gerschler, each used different training methods from each other. (Doherty 1964: 12f).)

The case can be made, in other words, that apparent training, no less than the teaching of virtue, depends on something else for its success than merely a mechanical application of stimulus-response conditionings.<sup>6</sup> But how can we best determine the nature of this process of training/education? What modern philosophers such as Richard Peters have favoured is a so-called "analytic"

method. Aiming to "clarify" our use of terms, these philosophers generally focus on how people are employing their expressions (such as "education") in the world--at the risk of introducing the ambiguities and biases of everyday usage.<sup>7</sup> As well, these approaches often seem remote from the actual, and often training-related concerns of today's students and culture.

As an alternative, I have adopted in my own research on these issues the method of the "thought experiment." A thought experiment states its finite set of assumptions at the outset, in order to minimize bias. Its hypothesis can then be posed in the clear context provided by those assumptions. Then, its confirmation (or refutation) can be sought not by tendencies of usage among English speakers, but rather by examining logically the consequences from accepting the hypothesis--i.e., by testing those consequences for their own consistency and plausibility.<sup>8</sup> Moreover, to ensure the relevance of this exercise, I select an "environment" for the experiment to reflect the key interests of those who are closely involved with real training.

In the following section, I summarize such a thought experiment which I have conducted. Its implications are crucial, I argue, for the nature and limits of training:

### The Thought Experiment

The "environment" for this thought experiment is derived from images borrowed from Bernard Suits. In his numerous works on the nature of games, Suits discusses the notion of a game-play "Utopia".<sup>9</sup> (I refer to that hypothetical game-play Utopia as "Gatopia.") In that world--where all instrumental needs for shelter, food, goods, and services are provided at will--the residents have nothing to do but play games.<sup>10</sup>

Now, what is so special about games, for our purposes, is that their goals are uniquely well defined. The players of each game (using Suits' definition) aim to accomplish--by rule-permitted means--precisely that definable state of affairs which Suits calls the "pre-lusory goal" (from the Latin "ludus" for "game"). In a race, for example, this goal might be to reach a certain line before your opponents do.

What the rules do is disallow from play more efficient means to attaining these pre-lusory goals. The players accept the rules just so they can engage in the game-play activity. A racer, for instance, could better ensure that he or she reached the line first by starting to run before the gun was sounded, or by sabotaging the opponents' running shoes...but for the sake of engaging in a true race he or she obeys the rules, and avoids such options. What follows is that for the game player, we know exactly what

his or her training must accomplish: Successful training is just that which facilitates attainment, in game-play conditions, of these pre-lusory ends.

Unfortunately, the training of real-world game players is rarely so straightforward. Irregularities of the playing surface, questionable judgements of officials, problems in one's home life, temptations for cheating and drug-taking--these all can create conditions which, though seemingly unrelated to the game as defined, can have clear impact on how it will be played, and so on how one should be preparing to play it. This is why I locate the thought experiment in "Gatopia." Here, we can abstract away those complexities and extraneous influences that affect "real world" game play--so the goals of training itself become crystal clear. The goals of the game are defined with precision, and the trainee is seeking mastery in their attainment.

In Gatopia, therefore, the central question for our world, "How can we prepare for success in real-world tasks?" becomes "How could one prepare to win in Gatopian games?" The hypothesis of the experiment is this--that "training" alone can provide all possible preparation for success. Indeed, in a Gatopia, where all instrumental needs can be met automatically, we might presume at the outset that training itself could be automated, and make winning a virtual certainty. But there are limitations, even in Gatopia: (1) If we view "talent" as an ability to

be trained, or, better, as a kind of ratio between training input and competence output, does the individual have sufficient talent to benefit from the training (or to benefit sufficiently)?<sup>11</sup> And (2) if game (or life) success depends on chance to any degree--and the ways are countless that this can happen--then, to that extent, chance, and not competence or training, will determine the outcome. (3) Factors such as discipline, motivation, and morale deserve mention; though these can all be handled, I believe, as either outcomes of training or reflections of some inner capacity (i.e. talent), or possibly both.<sup>12</sup>

So far, then, it appears that training prepares for success--but is limited in its effectiveness by the role of chance and the level of the trainee's talent. But is training the only process of preparation which is possible?

The findings from my thought experiment appear negative. A critical point is reached when what I call the "Training Paradox" is first encountered. It is at this juncture that the experimental hypothesis breaks down. For even under Utopian conditions, in games of skill between equally talented and disciplined players, it appears that even perfect training for reaching perfectly known goals of games cannot ensure success in those activities. Some other type of preparation--such as "education," perhaps--is required. These circumstances occur where creativity or decision making are demanded.

In brief, past training is powerless to assist when a true decision point has been reached: Something new, something creative, must happen. Training prepares one to perform specific, identifiable actions in predictable sequence; but if a situation is unique (and most in life are to some extent), then training can at best suggest what others have done in similar situations. (Even if one wishes to parrot some exemplar's approach to every problem, one still encounters problems of pattern recognition. That is, one must decide which paradigm of problem/response best models the present circumstances.)<sup>13</sup>

In Gatopia, this paradox is first met where chance plays a role in games. A base runner in baseball may have been perfectly trained to steal bases--that is, in the mechanics of this manoeuvre; but in any given attempt there is always the chance for failure. Over the course of a season, however, a player can maximize his rate of success if he learns to "read" each situation carefully--the pitcher's moves, the count, the infielders' positions, and so on--and then quickly make a judgement of his advantage. In practice, the particulars of the player's dilemma--that is, the exact conditions to be responded to--will be different on each occasion; yet, one hopes there could be some way to prepare, in general, for meeting all of them. If there is such a way, it goes beyond training, and provides a facility which goes beyond mere competence in technique.

By introducing this Training Paradox in an imagined "Gatopia," it is brought into sharp relief. As mentioned, its goals are known perfectly and the training for them can be perfectly imparted; nonetheless, preparation based only on training is incomplete. If one next considers the causes-for-success in the real world, training's limitations become even more apparent. Here, the issues of the Training Paradox are compounded because training goals, themselves, are more complex and training, itself, more difficult to accomplish. Our judgements of how successful training has really been are often tempered by factors we have not yet considered. For instance: (1) Are we looking for short-term, immediately testable competence, or for some measure of long-term, adaptable competence as the nature of tasks and job requirements change? (2) From what perspective are we to judge success? Individual productivity only, or the contribution to the team's success? Do we assess only the gross profitability of one's work, or do we count one's sensitivity to, for example, environmental concerns? That is, from what perspective are we to judge one's competence? (3) The moral view is, in effect, the largest, all-human perspective from which one could judge success. Are the trainee's actions, however technically impressive, harmonious with society's goals?

A good example of these sorts of complexity can be found in the training required for police sharpshooters. Compare their training needs with those for competitors in Olympic sharpshooting competitions. In the Olympics, we know exactly what counts as sharpshooting success--namely, to hit the target consistently from specified positions and distances. Though, presumably, we also expect police sharpshooters to hit the targets they aim for, there is more we expect, as well. For imagine that a newly trained officer, on duty in a riot situation, has aimed for, shot and killed a 14-year-old youth. Almost inevitably, the public and media would protest: "He should have fired warning shots, or aimed for the legs." That the officer's marksmanship was Olympian in quality would not make his or her actions "successful."

In other words, the goals of police sharpshooting are not really just to hit targets with accuracy; rather, they call for using marksmanship skills to preserve "public order" in a "responsible and moral" fashion. Before we can prepare our officers, we must first explore these concepts: Just what is the "order" which we wish to see defended? Are officers expected to question these standards, using critical, moral judgement, or instead obey all orders, regardless? What is our attitude towards violent enforcement, and towards risks to innocent bystanders? Without answering such questions, we can never truly evaluate the training-success of our police, let alone ensure it through their academies.

Since, for all these reasons, simplistic training cannot fully provide for success preparation, something else must be needed. That something, I would argue, is "education." But what sort of education? In my view, a primarily "Deweyan" education is called for.

#### Deweyan Education and Beyond

To lay the groundwork for that last claim, let us briefly consider the focus of that Deweyan educational philosophy. Of special interest is how John Dewey employs his key metaphor--of education as "reconstruction"--to resolve the traditional dichotomies associated with education, such as that between the child's interests in the process and the society's interests. By drawing initially upon the individual's own "instincts and power," society, through education, can transform these "into terms of their social equivalents." (Dewey 1959b: 20-22) What is crucial, for Dewey, is that students become practiced in the method of science. By this means, they can meet the challenges of life, and effect the reconstructions of self and environment which are needed to overcome disturbances and doubts. And they can do this in a way which is neither a haphazard trial-by-error nor a dogmatic clinging to polarized beliefs, but, instead, a method to be employed in, and adapted to, whatever difficulties one confronts. In short, and in potential answer to the Training Paradox,

Dewey would prepare his students for action in cases of uncertainty, and where creativity and decision making are required.

In reconstructing so-called dichotomies of education, Dewey makes a link between education and training. Through the latter, an individual gains the experience and exposure to social meanings that can equip him or her for the broad understandings expected from education. That is why Dewey promotes "manual training" for the schools: not to produce a generation of cooks and tailors, but so that students can personally participate in these basic activities of culture, and thereby transform their understandings of both their society and themselves. (Dewey 1976: 231)

Yet even John Dewey, in my view, did not quite complete the link between training and education. He has shown how the former has a critical role in the latter. But, for the most part (barring some possible exceptions, for example, in his article "Learning to Earn" (Dewey 1980a)) he does not attend to the corresponding role of education itself in the process of training. People, after all, do, in fact, become cooks and tailors. Training is a crucial process in its own right, apart from its value in a liberal education. However, this training, to be effective, must indeed be supplemented in some way by a process of education; otherwise, trained persons would only be prepared for routine tasks and predictable outcomes. In reality, most tasks of any consequence contain at least

some elements which are not totally predictable, and so which call for human judgement.

My own proposal is to start from Dewey's educational philosophy as a base, and then reconstruct a somewhat expanded view of education. What is needed is to recognize that education and training alike are both aspects of preparing individuals for life--in any times, but especially today, in our changing and technologically oriented environment. Training gears to the accomplishment of clearly specifiable goals. Education prepares one for the decision making and creativity which are almost always required in the performance of those trained-for tasks.

Dewey speaks of the "scientific method" as the essential paradigm for solving new problems. It is by assessing the relevant information, posing and testing hypotheses, and reconstructing those hypotheses based on test results, that progress can be made in an uncertain world. For the most part, I accept this position; yet, I feel much more attention is needed than Dewey generally gives to that notion of "generating" the hypotheses. The term "scientific method" implies a formal rigour; and, yes, in the complete process, disciplined thought is certainly required. However, the role for imagination, and free-flowing suggestion, in the creative process must not be overlooked. Otherwise, truly novel hypotheses would never be generated.

What is called for here is an exploration of theories (such as Bruner's, in On Knowing: Essays for the Left Hand (Bruner 1962)) which distinguish between two interrelated means of cognition. A balance, that is, must be maintained between our logical/procedural capacities and our intuitive and pattern recognizing abilities. Just as Plato implies in the Meno that a successful inquiry demands both reasoning and "recollection"--a kind of pattern recognition, perhaps--I would now suggest that any task success, in general, demands both focused training in that task plus practice in making creative leaps of understanding and hypothesis construction. For this, the sort of project-orientated education which Dewey proposes may indeed provide the firmest basis--for, here, one has continuous opportunities to practice one's skills, generate new hypotheses, and exercise the method of science.

I would certainly not argue that a new "theory of education" is being offered in this paper. But I do wish to emphasize that traditional theories are lacking in a critical next step. Whether one's interest is primarily "training" or primarily "education," it is now clear that a unifying perspective must be found. Neither process is complete in isolation.

### A Research Agenda

At this point, I would like to propose a research agenda, to help us understand this process of preparation. In particular, any complete "theory of preparation," I believe, must address at least these four issues:

(1) Such notions of popular psychology as intuitive or "right-brained" thinking, as opposed to logical and rigorous "left-brained" analysis, need to be seriously examined--and critiqued--by philosophers, educators, and other scholars. It is not, of course, the physiology of the brain which is at issue in this study, but the question whether these distinctions of function and orientation are supportable; and, if so, whether they have philosophical significance.<sup>14</sup> For example, how do such models integrate with our theories of knowledge? Is the right brain's creativity merely the reassociating of ideas, or is it, as in Plato's model, potentially guided by a "remembrance" of some underlying principles?

(2) If what schools promote is, indeed, both training and education, in some mixture, then it would be fruitful to identify which aspects are primarily training and which primarily education; then we could address each component more appropriately. For instance, the imparting of skills in spelling or parsing grammar would seem essentially tasks

for training; therefore, training theories, rather than theories of education, would seem more useful for effecting improvements. Yet for imparting "critical thinking" and, perhaps, "social conscience," and so on, the process of education would seem more applicable. In this case, we must aim to discover, as best we can, what ordering of experiences, following what guidelines, might best contribute to the desired results. One would expect this search to be ongoing: Because education is a preparing for conscious response to new situations, there can be no permanent prescription for a fixed educational procedure.

(3) A third recommendation is to apply the findings of this paper to a modern development in training theory and practice. Colleges, training companies, and designers of training software are increasingly promoting the merits of so-called "competency-based," "modular," or "programmed" instruction.<sup>15</sup> The appeal is that trainees can learn, potentially, at their own pace and at their own convenience, by confronting each training module only once they have demonstrated competence in the preceding module. Often, computers are used to supervise students' progress and to generate tests for each segment.

For clear-cut tasks in which competence can be precisely defined--i.e. for tasks requiring training--such methods are indisputably quite efficient. But are these

methods, if depended on too completely, failing to prepare for decision making, creativity, and moral judgement in the performance of trainees (since not everything they will encounter back in the real world will be as predictable and non-controversial as their pre-set tests)? How can we test if this is so? If this result is confirmed, can the training methods be modified or enhanced to overcome the problem?

(4) My final research proposal is to apply these findings to modern research in computer "Expert Systems." The goals of such systems are precisely to "make decisions" in realms where, previously, it was felt that human judgement was required. Since Expert Systems, like any computer program, follow precisely coded rules, their decision-making success, if any, would have clear impact on my own theory of the "right-brained," non-rule-oriented aspect of decisions. What are some areas where mere training to decide breaks down, and where genuine decision making is called for? Can computers truly be programmed to handle such cases? What would a machine need to do if it were to count as successfully making such "decisions." How would it accomplish this? The answers may be elusive--because, in effect, we are asking what would, in the case of humans, be counted as making an "educated" response. But, indeed, the greatest value of this exercise may be to help shed light on these very human questions about making--and preparing to make--decisions.

## Conclusions

As I have tried to illustrate, there is much to be learned about how we prepare to decide. In this monograph, I have attempted to make a start, by looking at the integral relation between education and training--both of which are components, I have argued, of preparation. John Dewey's contributions, in particular, to educational philosophy have been specially noted.

Training, I have said, is the preparation for activities whose goals can be specified with precision. If these goals are not reached, this could be a function not only of poor training, but also of a range of factors including the trainee's talent, discipline, morale, and, quite possibly, poor luck. If there is some need for decision making in a task, or if there is room for human discretion and creativity, then training does not provide the sole basis for success in that activity.

Education, on the other hand, is the process which does prepare for creative and decisive response to the world's unknowns. Because one is dealing with uncertainty, one cannot say that unwanted results reflect, necessarily, a response that is uneducated. To be educated is to be aware of, and employ, methods--such as what Dewey calls the scientific method--which are most likely, though not certain, to lead in desired directions. To be educated is

also to be aware of one's own resources for intuitive and non-linear thought. Where these can be marshalled in support of a defensible method for problem solving or innovation, then chances of success are increased.

In developing these views, I relied, in part, on a thought experiment which I described. I was suggested that pure training, if it could exist, would be found in the context of playing a game--particularly, a game played in a Utopia. Here, every aspect of a trainee's goal can be readily identified. We have seen, however, that even under these idealized conditions, training cannot prepare for decision making and creativity. This led to a renewed look at education, to see if it could fill this gap.

My findings, I suggest, have taken us "Beyond Dewey." Dewey, to be sure, proposes a theory of education which solves, in part, the so-called Training Paradox. Education imparts an ability to solve problems and grasp meanings which can prepare for challenges training alone cannot handle. However, we go "beyond" the method proposed by Dewey when we emphasize the crucial role for intuition and other "right brained" processes in hypothesis and solution generation. Dewey has hinted at such notions in, for example, his How We Think (Dewey 1978), but here they are made explicit, and central to the thesis.

The call for future research is to take these concepts and integrate them, as far as possible, within an embracing philosophy of cognition and preparation-capacity. At the

same time, we must study the import of these ideas for future practice. How can we modify our society's current procedures for education and training to maximize our effectiveness in both realms--to provide, that is, both the needed competence in today's skills and the essential adaptability for meeting changes, problems and unique situations? If this paper has clarified the aims of these two processes, of education and training, and how they must be distinguished yet employed together, then it has prepared a crucial groundwork for this important research challenge.

## ENDNOTES

- 1 This unsigned editorial appeared in the Toronto Star, February 18, 1989, p. A20.
- 2 The nature and limits of training will be clarified in the course of this paper. For present purposes, I would accept R.S. Peters' concept that training applies when "(i) there is some specifiably type of performance that has to be mastered, (ii) practice is [typically] required for the mastery of it, (iii) little emphasis is placed on the underlying rationale." (Peters 1967b: 15) The purpose of training, as Walter Buckingham writes in The Impending Educational Revolution is "to develop certain automatic facilities." (Lusterman 1977: 8)
- 3 This suggestion was offered, in conversation, by Dr. Brian Hendley of the University of Waterloo.
- 4 This devaluing of training issues is made quite explicit in Robert Hutchins' article "Education for Freedom" (Christian Century, November 15, 1944). When training is advocated as a goal for (vocational) education, his advice is "to forget it." As demonstrated, he claims, by war training programs in industry, "industry can train its hands if it has to, and can do it at lightning speed." (Hook 1945: 420) Even Dewey tends to identify training as the mere inculcation of blind, unconscious, and unintelligent response. (Dewey 1966: 29) One of Peters' definitions for training is "the acquisition of appropriate habits of response in a limited situation." (Peters 1964: 28)
- 5 All that is required of training, according to Charles Brauner, in his article "Accustoming: The Hidden Concept in Training," is that it involve the "exposing or subjecting [of] individuals to some program or set of experiences designed or calculated to achieve proficiency in some skill or activity of limited scope." Training is successful so long as proficiency is gained in the thing to be mastered--be it driving trucks or picking pockets. (Brauner 1978: 166)

As for what "remedies and devices" might affect this training, it often happens that the old traditional methods are effective. If these "old-fashioned"

techniques are examined scientifically, the goal is not necessarily to replace them, but rather to ensure that, in using them, we are not merely "duplicating purely adventitious accompaniments to successful outcomes." (Weiss 1969: 43)

- 6 Brauner distinguishes mere "occupations" from "professions"--based on the extent to which the requirements for doing the job well "extend beyond those proficiencies that can be achieved by training [alone]." To establish that teaching is a profession, for example, involves "proving that teachers are more than technicians and, as a consequence, must be educated beyond levels that training would provide." (Brauner 1978: 167) In other words, so-called "teacher training" is among those cases where simplistic conditioning is an insufficient means, and when something else--like "education"--is required.

Unlike Brauner, however, I would suggest that human endeavour tends to fall on a continuum, lying between his extremes of simple occupations and professions. Just as he admits that professionals, too, require some technical training, so also do truck drivers require some measure of education.

- 7 This point has been forcefully stated by Hendley in his Dewey, Russell, Whitehead: Philosophers as Educators. (Hendley 1986) Two key figures in modern analytical philosophy of education have been Richard Peters and Paul Hirst. Seeing themselves as promoting a return to a Socratic sort of philosophic questioning, they admonish philosophers of education to "make explicit the principles which underlie" their use of words. But failing, for example, to find a clear definition for "education" which covers "all the cases where it still makes perfectly good sense to call a process or activity educational," they are effectively led to claim that "when we defend the ideal of an 'educated person' we are really speaking of the nineteenth-century notion of someone with an all-round development: morally, intellectually, spiritually." Not only is this a "questionable empirical claim about word usage among educators," says Hendley, but "even if true, [it] is surely not a strong basis for a statement of the way the term should be understood." (Hendley 1986: 4ff)

- 8 The method of inquiry being described is essentially the experimental method promoted by John Dewey. Though, ultimately, he believes that constructive inquiry must include "activities that actually modify physical conditions" (Dewey 1933: 188), he also makes provision for potential "thought experiments"--when he writes that reflective thought should include "testing of hypothesis by overt or imaginative action." (Emphasis added)(Ibid.: 107) More will be said on Dewey's views later in this paper.
- 9 This notion is discussed at length in Suits' The Grasshopper: Games, Life and Utopia. (Suits 1978) He expands on the ideas in his article "Games and Utopia: Posthumous Reflections." (Suits 1984)
- 10 Even in Suits' Utopia, one might argue, there remains the potential for engaging in non-directed "play," such as simple jumping up and down for joy. But as soon as this activity takes on some direction (e.g. "jump up and down ten times"), its new goals become game goals--accomplished just for the sake of the activity.
- 11 In practice, "talent" is generally taken to refer to a long-term--and possibly a life-long--propensity of the trainee. In that case, this first limitation on training is somewhat broader in scope than "talent", per se. For example, one case where a player may be lacking the attributes for success-trainability could arise when the player is injured, or lacks some pre-requisite skill or knowledge. Such failings, even if short term, would still tend to limit training effectiveness--though, in describing the problem, we would not usually say that the injured player has "lost their talent." However, this normal usage tends to confirm my claim that "talent" refers to an inherent ability to be trained: We are inclined to think that the injured athlete (a) has already succeeded in much training to this point, and (b) is likely (in the long term--though not perhaps just now) to continue demonstrating this propensity.
- 12 One more possible limitation on training effectiveness could also be mentioned: people's everyday "slips and lapses." In an excellent analysis, James Reason defines such error as "a planned action that fails to achieve its desired consequences"--not due to the intervention of chance or other unforeseen agency. (Reason 1977: 37) Categories of failure include "Selection Failure," "Discrimination Failure," "Storage Failure," and "Test Failure." (Ibid.: 35f)

Since even well-trained, talented and motivated individuals can succumb to these errors, they may well form an additional category of reason for failure or success. For example, a racer may lose the event because he or she mis-attended at some key moment. However, more research needs to be conducted as to whether lapses are a type of training failure (i.e. if there are ways which could be learned to avoid the errors) or simply chance misfirings (which make them effectively a matter of fortune).

- 13 This last point suggests that even including simulation exercises in training might not prepare one fully for future decisions in practice. There always remains a gap between the features of the example case and those in the actual circumstances. This "gap," in fact, has implications for the well-known problems of "transferring" learned knowledge.
- 14 A pioneer in scientific research which has advanced the notion of left-brain/right-brain specializations has been Roger Sperry. His subjects have been epileptics whose brain hemispheres had been separated surgically to minimize the intensity of seizures. This allowed him to isolate each hemisphere's functions. What he and his followers have found is that the left hemisphere "specializes in verbal, quantitative, and analytical work...[while the right hemisphere] is more visually, artistically, and intuitively adroit." (Rowan 1986b: 26) Other researchers have reached similar findings by clinically observing patients who have suffered damage to one or the other of their brain hemispheres. Confirmation of these clinical results has also been coming from studies of normal people; for example, EEG electrodes test their brain-hemisphere activity as they perform certain analytical or pattern-recognizing tasks. (Jaynes 1976: 118f)

While these results are conclusive, I believe, in establishing some brain hemisphere specialization, they do not in themselves make certain just how--or where--the brain generates its intuitions, generalizations, innovations, and so on. While I recommend further research in these areas, it is enough for present purposes if, wherever located, some proven distinction of thought-types is established.

- 15 The State of Florida joined the forefront of that movement in 1983, when its Department of Education announced that, as a matter of policy, all state-wide vocational training should now proceed through a

"competency-based" format. (State of Florida 1983; see also Andreyka and Beverly n.d.) Compare the promise of Saskatchewan's Northern Institute of Technology, in a promotional flyer, to "ensure"--by using competency-based learning techniques--that "Saskatchewan's labour force is skilled, responsive, and adaptable." (Northern Institute of Technology 1986) Although Ontario's St. Lawrence College delivers its training primarily by traditional methods, its new Community Learning Centre has likewise been implementing a competency-based training approach.

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