

Using Abductive Research Logic: ‘The Logic of Discovery’, to Construct a Rigorous Explanation of Amorphous Evaluation Findings

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Background: Two kinds of research logic prevail in scientific research: deductive research logic and inductive research logic. However, both fail in the field of evaluation, especially evaluation conducted in unfamiliar environments.

Purpose: In this article I wish to suggest the application of a research logic—*abduction—the logic of discovery*—which is powerful and very effective in constructing and validating explanations of new phenomena (*evaluation findings*, in particular).

Setting: The primary focus of the article is theoretic with a case example illustrating the practice of using the logic of discovery.

Intervention: Not applicable.

Research Design: Not applicable.

Data Collection and Analysis: Not applicable.

Findings: Not applicable.

Keywords: program evaluation; globalization; multiculturalism; abduction; logic of discovery

"...You have been at your club all day, I perceive."

"My dear Holmes!"

"Am I right?"

"Certainly, but how?"

He laughed at my bewildered expression.

"There is a delightful freshness about you, Watson, which makes it a pleasure to exercise any small powers which I possess at your expense. A gentleman goes forth on a showery and miry day. He returns immaculate in the evening with the gloss still on his hat and his boots. He has been a fixture therefore all day. He is not a man with intimate friends. Where, then, could he have been? Is it not obvious?" (Doyle, 1986)

The British author, Arthur Conan Doyle, endowed his protagonist with the ability to use logical inferences to examine hypotheses. In the example above, Sherlock Holmes uses what is known in logic as a "disjunctive inference (syllogism)" (Copi, 1961), which is verified through a direct question to Dr. Watson:

If A (Watson is dry) then B (he was inside a building).

If B (he was inside a building) then C (he was with friends) or D (he was at his club).

If not C (Watson has no friends) then D (it is therefore a reasonable assumption that he was at his club).

Logical inferences, and there are 14 main ones, enable us to structure our processes of reasoning and examining hypotheses. This is their strength. I shall not dwell on them here,¹ but will come back to their importance later.

¹ Every inferential structure has a name and these can easily be found in any introduction to logic (Copi, 1961, for example).

Two kinds of research logic prevail in scientific research: deductive research logic and inductive research logic. In this article I wish to suggest the application of a third kind of research logic—*abduction—the logic of discovery*—which is powerful and very effective in constructing and validating explanations of new phenomena (*evaluation* findings, in particular). In a previous article (Levin-Rozalis, 2000), I argued that one of the problems evaluators face is a lack of accepted and tested criteria for quality, and I suggested using Peirce's abduction as a logical criterion for evaluating programs and projects. In this article, I suggest employing Peirce's abductive research logic as a tool for evaluators in constructing sound explanations for their findings, especially in those cases when quantitative randomized controlled trials (RCT) methods are not possible and, thus, there is a serious question of generalization.

This is especially true when one is working in unfamiliar environments, within other cultures, or with variables that are not clear or do not exist. This is often the case nowadays with globalization and the spread of evaluation to different countries and cultures: we, as

evaluators, are not always on a safe ground. There is a tension between context-related evaluation (which takes into account the specific local situation and the cultural norms and values of the evaluand) on the one hand and rigorous universal variables and standards on the other.

My experience is that applying abductive research logic in the analysis of evaluation findings can connect the local with the universal. This, then, can lead to more profound and context-related findings, not to mention a greater contribution of evaluation to scientific knowledge.

To begin with, I will explain Peirce's concept of *abduction*—the *logic of discovery* and its unique ability to deal with new phenomena, in contrast to the two conventional procedures used in research: *deduction* and *induction*. I will then argue that evaluators often encounter “new phenomena” during their work, and thus, Peirce's abductive research logic is an ideal means for examining hypotheses. Finally, I will demonstrate the application of this procedure using an example.

Charles Sanders Peirce, the American philosopher and founder of the Pragmatic School of philosophy, maintained that the *process of discovery* in science is as important as the proof and must, therefore, meet logical criteria (Burks, 1943). This view contradicts the conventional approach in scientific philosophy and the world of science, which finds the process of discovery (or of propounding hypotheses arising from facts) to be “uninteresting”—a process that is most likely connected to the psychology, sociology, knowledge and thinking of the times, which have nothing at all to do with the research process.

Peirce does not accept this approach and claims that we must not leave scientific discovery hidden in the corner because, in the end, it is the *discovery process* that creates and advances science and human knowledge. Discoveries are, therefore, a fundamental element of science and knowledge.

Peirce formulated a research logic (as distinct from “research methodology”), which he called *abduction*. This is different from *deduction* and *induction* and covers what he called “the logic of discovery” (Rescher, 1978; Rosental, 1993), a term that I'll use from now on. According to Peirce, in a process of discovery, we confront a new or surprising fact (a problem), decide how to address it, create an initial explanation, and test it against *all* our observations and facts to see if it works. Even a single observation that does not fit this preliminary explanation tells us that the explanation is not good enough. At the stage of drawing conclusions, Peirce demands that we take our explanations or conclusions, convert them into hypotheses “on probation” and explore further into a wider scope of data. In each such cycle, our explanations become broader, more general and more abstract (Levin-Rozalis, 2000; Peirce, 1955a, 1955b; Yu, 1994). A hypothesis on probation is said to meet the logical criteria only if it resolves the dilemma, problem or difficulty for which it was formulated—but not if it only corresponds with a conception of external reality or theory. With this logic, Peirce created an inseparable link between new or surprising facts that we face in the “real world” (as it is perceived in our minds) and their explanation (Levin-Rozalis, 2004a, 2004b).

When we, as evaluators, arrive at a new project or program, or deal with a new policy, many new facts that were

unknown to us in advance come to light. The less we are familiar with the context, the more new facts, ideas, questions and problems (“discoveries” in Peirce’s language) there are for us to deal with. And “to deal with” is to understand them, to find an explanation. Yet, explanations in themselves do not constitute a theory. Peirce believes that only observation can create and ground theories. Our reasons for *suggesting* an explanation (i.e., a hypothesis) in the first place are those that make the hypothesis conceivable, while our reasons for *accepting* a hypothesis are the reasons that make the hypothesis a scientific truth (i.e., examining the hypothesis against the facts of reality, against our entire body of observation) (Hanson, 1958, 1960; Fann, 1970).

Pierce went against several hundred years of conventional science in which scientists confirm or refute a theory and then want us to reconnect to the facts that, in Peirce’s perception, generated the theory in the first place. Peirce asserts that scientific discoveries—like any other scientific process—must be subject to logical criteria, but it is first necessary to distinguish between the logic of discovery and the logic of proof. He is well aware that ordinary research logic (both deduction and induction) is unsuited to dealing with the processes of discovery (i.e., the finding of new facts). In his search for a more appropriate logical category to deal with the field of discovery, Peirce created his new category of ‘abduction—the logic of discovery.’

At this point, I want to explain why neither deduction nor induction are capable of explaining scientific discoveries.

Deduction works within a known theory in order to refute it. The theory dictates the concepts, statements and

claims, that is, the relationship between the concepts and the way in which they vary. For example, if we work according to Piaget’s theory, we are dealing with cognitive development taking place in discernible stages as it occurs. We are not dealing with class influences about learning; we can, of course, examine this question, but then we have to put it into Piaget’s terms:

1. Children growing up in different life situations will develop differently.
2. Children growing up in different socio-economic strata grow up in different life situations and will therefore develop differently.
3. Now we must define the differences between the different socio-economic strata in Piaget’s terms (i.e., a description of types of coping with the world or activities in the world arising from different socio-economic situations).
4. We must formulate a hypothesis about the types of differences found, in accordance with the theory.
5. The hypothesis must then be examined in the field through an appropriate examination process (i.e., tools, research manipulation, population).

The steps from the theory’s definition of relations between concepts to our assumptions (which have to be examined in the field) have to be made in accordance with logical inferences of some kind, to ensure that the process from the theory to the assumption is within known constraints and that the assumption is indeed connected to the theory from which it is derived. For example, the first step above is also a disjunctive inference:

If A (children grow up in different strata) then B (they grow up in different life situations).

If B (children grow up in different life situations) then C (they will develop differently).

As a matter of fact, we have much more than one syllogism here. We usually don't use pure logic as such, but we have to explain, using Piaget's set of concepts, why different strata are considered as different life situations and what kind of differences we expect to see among the different groups of children. We need this rigorous process to ensure that our assumptions, which are to be examined during the research process, are indeed indispensably derived from the theory.

Peirce claims that deduction is unsuitable for a process of discovery. The deductive process of formulating a hypothesis from a theory is structured in such a way that the hypothesis is the *explanandum*: it is explained by the theory. This being so, the hypothesis holds nothing new and it must not contain anything new—as opposed to the *explanance*, which is the theory. If the hypothesis contains anything new, there will not in fact be an examination of the theory but, rather, of something new. When a theory reaches the framework of the deductive hypothesis, scientific research ends. At that point, the examination process of the theory and the hypotheses deriving from it begins. This is the logic of proof.

Induction is employed in a situation in which we already have empirical generalization. Let us assume that, through one process or another, we have found that at a certain school there are differences between the achievements of children from different socio-economic

strata. At this point we can do several things:

1. We can examine the probability of finding differences such as these in other populations as well. Out of a desire to formulate a general probability law, the hypotheses are intended to facilitate the examination of the probability that these phenomena will be repeated beyond a specific time and place.
2. We use logical induction to find an explanation for the finding.

Inductive logic, claims Peirce, also fails when it comes to introducing something new, for by its very nature, it deals with phenomena whose range of variance is already known (inductive logic may revise its explanations but not the actual observation of the phenomena (Braithwaite, 1934; Davis, 1972; Hawthorne, 2008; Rescher, 1978; Skyrms, 2000)).

To sum up, deduction fails when it tries to innovate. This system of making assumptions is good for research that reviews theories in order to refine them (Copi, 1961; Fann, 1970; Hanson, 1958; Peirce, 1931-1935 [2.860]; Rescher, 1978; Turner, 1986; Wallace, 1969). Inductive logic, also fails when it tries to innovate because, by its nature, it deals with phenomena whose characteristics are known. Induction is where we generalize from a number of cases to a whole class (Pierce, 1931-1935 [2.624]). The generalization is from a sample to all phenomena of the same kind. The process attempts to check the probability that these known phenomena will repeat themselves beyond the limits of time and space and, in this way, to formulate a law of general probability (Davis, 1972; Hanson, 1958, 1960; Rescher, 1978).

So, if deduction is an instrument for checking theories, and induction is one for checking probabilities, what approach is there for discovery?

In the eyes of Peirce, a process of discovery occurs when we encounter “a surprising fact” that we try to interpret. This interpretive process is a generative one. This is “a process of drawing conclusions that includes *preferring* one hypothesis over others which can explain the facts, when *there is no basis in previous knowledge* that could justify this preference or any *checking* done *after* the hypothesis *was subjected to a trial period*” (Peirce, 1955b, p. 151, emphasis added). According to Fox (1998), abduction, the logic of discovery, is “inference to the *best* explanation (p. 1).” In contrast to the logic of deductive and inductive research, where hypotheses are based on theory and empirical generalization, the hypothesis that Peirce mentions in his definition of the ‘logic of discovery’ arises *not* from any *theory*, but from the *facts*. The ‘logic of discovery’ enables us to propose hypotheses (possible explanations) based on our experience with immediate reality. The hypothesis (our explanation) must stand up, in principle at least, to empirical scrutiny (Peirce, 1955b; Rescher, 1978). It must also be congruent with all our observations of the phenomenon.

Abduction, the logic of discovery, derives an explanatory hypothesis from conclusions drawn from a body of facts. Conclusions drawn in an abductive process usually pertain to a new idea, whereas deductive conclusions generally stem from their predecessors, continuing them forward (Takeda & Nishida, 1994). The abductive process—that of *proposing* the explanation—quite possibly has psychological, cultural or social origins. An explanation can be raised because the

phenomena are related to previous knowledge or a relevant world of content, or because they are similar to other phenomena in the field being studied; an analogy can be seen between phenomena for which the explanation is theoretically formulated (Paavola & Hakkarainen, 2005).

In Peirce’s view, the origins of the explanation are less important: there is nothing in them that explains the actual *choice* of one explanation from an almost unlimited number of possible explanations. The choice is the most important thing: choosing an explanation is a rational process and must therefore meet logical criteria. In our case, the logical criterion is *the quality of the reasoning behind the choice*, and whether the conclusion we reach by using this explanation will be congruent with the facts.

The logic of discovery is a two-stage process. The first stage involves *choosing* the explanation; the second is its *examination*, which Peirce calls the “retroduction” process (i.e., carefully checking our working hypothesis against all facts and explaining your reasoning—on which I shall expand later). The subject of “explanation” is of great importance in Peirce’s theory because explanation does not stop at describing what exists. The power of science is in providing an explanation, even an ad hoc one, until proving otherwise.

The process proposed by Peirce obliges the evaluator to integrate two important elements into the evaluation work—the *findings* and the *explanation*—and to connect them. In the field of evaluation, we often come across evaluations that spread before us a variety of findings, often well organized in tables and graphs but without an explanation, interpretation or application of the data to the target

audience. On the other hand, we have seen some wonderfully creative reports in which it is unclear to the reader precisely which data they are relying on.

In the course of constructing explanations of an evaluation's findings, one is actually formulating a hypothesis. However, because this hypothesis has not yet been supported or confirmed in any way (nor has it the support of a theory), it is what Peirce calls "a hypothesis on probation." Nevertheless, Peirce argues that the hypothesis must, at this stage, stand up to double logical criteria. First of all, it must meet the criteria that permit it to be posited in the first place: the criteria of functional logic (*logica utens*) (Burks, 1943) which is essentially critical thinking. Second, the hypothesis must meet the criteria of being a fitting explanation—a retrodution (checking our working hypothesis against all our observations)—which is an educated systematic examination, conforming to the laws of logic, using logical inferences (*logica docent*). The following example will demonstrate the actual application of Peirce's approach of the logic of discovery—abduction and retrodution—in an actual evaluation.

The program examined was a community intervention whose objective was to improve the integration of immigrant women within the host society by helping them to adopt initiative behavior. The program involved groups of women who had immigrated to Israel from different parts of the Caucasus (in the former Soviet Union), and it was accompanied by evaluation. The Caucasian immigrants tend to live in closed traditional communities, maintaining their customs and language. The evaluation team knew very little about this culture and did not speak the language (Meinrat, 2002); they faced a

challenge similar to that of evaluators conducting an evaluation in a foreign country.

Loyal to abductive research logic, we, the evaluation team, decided to let the "surprising facts" come openly to us, that is, we tried to be as open as possible without making preliminary assumptions. We met the program steering committee and managers, and together we decided on an open evaluation process in which we would not use any well-defined questions or rigorous data-collection methods, thereby giving up strict control of the data collection.

It is important to state here that this did not mean that it was not a rigorous study. The logic of discovery—the abduction research logic—leads us to work like a forensic team, which, through its scientific and rigorous approach, provides one of the best examples of the actual use of the 'logic of discovery.' Like a forensic team, we used any means, any tool in hand (except for two widely accepted evaluative tools: questionnaires and interviews), to collect data. We could not use questionnaires because the groups were too small and we did not want to assume that all groups were alike. More important was the suspicious nature of this community, especially in their early days in a new country, which presented a real threat to the reliability of any interviews. Hebrew was not an option, and we were reluctant to use translation to and from a language we could not control, so we gave up interviews as well.

Our worldview maintains that evaluators have to acknowledge that their ways of thinking and of doing things are not always the best, and that there are other ways of doing things that might be more appropriate in different situations—we must be more modest and less ethnocentric. In accord with this

principle, we believe that evaluators must listen carefully to what their evaluatees have to say. By listening, we will learn, our work will benefit and we will be able to foster a capacity for evaluation that makes sense to our evaluatees. By listening to our evaluatees, we can exchange knowledge, acquiring information that we lack, for, in our opinion, in order to conduct a worthy evaluation, evaluators need two bodies of knowledge: the evaluators' own professional knowledge and the evaluatees' knowledge of their own life system. Exchanging knowledge is possible only if we, as evaluators, will leave behind our preliminary assumptions, as much as possible, and be aware of our own biases from our own worldview, values and norms. Even though evaluation is an evaluative, judgmental process, we, the evaluators, must not be judgmental at all. We have to keep our minds, eyes and ears as open as possible.

So in our first meetings with the program steering committee and managers, we explained our professional worldview and our difficulty and asked for their cooperation. After a long discussion in which we learned a lot about the ways the program is operated, power relations, working norms and community values, it was decided that the managers and some senior staff would guide the junior staff in talking to the women (both formally and informally) about the issues at stake, asking them to tell stories and descriptions. The program staff would then write down these stories and descriptions immediately after the meetings.

The program managers also shared some perplexing phenomena with us. They could detect some changes in the women, such as the way they dressed: many women had replaced their traditional, old-fashioned, graceless

clothes with modern clothing. And more than that, they had changed such things as hairstyles and make-up. "But those are superficial changes," claimed the managers. In other areas, the women seemed to have become more traditional: there was much more emphasis on traditional habits and customs during holidays and events, they spoke much less Hebrew with their children, and so on. "As if there were a regression in the essentials."

We drew our first conclusions from these first meetings. For example, we thought that the professional senior staff (who were people from the same community who had arrived in Israel several years earlier) were ambivalent about the community's closeness and customs. They wanted the women to become "mainstream Israelis" and not to stick to their traditions. We felt that this ambivalence exerted pressure on the women to change faster than they were ready to. We also learned from these first discussions that the community's suspicion toward outsiders was also felt about these professionals, who were perceived as "sitting on the fence" (Meinrat, 2002) and by that giving the women a double message of both acceptance and condemned. We thought this could explain some of the difficulties the program faced.

But we need to remind ourselves of Peirce's concept of the hypothesis on probation (Fann, 1970; Yu, 1994). We cannot stop the process of providing an explanation for "a surprising fact" with the first explanation that appears suitable. We must convert the explanation into a hypothesis on probation and examine it against all the knowledge at our disposal. We must continue converting our explanations into hypotheses until we reach a situation in which all the facts at

our disposal are congruent with the explanation. In this process, the explanation usually moves away from the immediate facts and becomes more generalized and abstract, thereby increasing its ability to explain phenomena beyond the individual case.

The reason an apple falls downward from a tree is not explained by the proof that all apples fall downward from trees. The explanation does not mention “falling” or “downward” but, rather, “gravity” and the “mass of objects.” In other words, it does not employ terms of observation but provides its own terminology, and thus, from an explanation of a one-time phenomenon, it becomes a general scientific law.

We converted our conclusions into hypotheses to be checked as the evaluation process proceeded. That was the first abductive stage. We had other hypotheses, too, but here I want to focus on the evaluation logic, the ‘logic of discovery’ process and not on the program.

As I described above, the program staff had been given the leeway to do things in the fashion they themselves determined to be best. At this first stage, we conducted some observations of group activities and were impressed by the warmth and happiness that were expressed by the women among themselves and to the group leader during meetings. But the active role of the evaluator commenced when the junior staff began to come with the data they collected. The data arrived in different ways—mostly as descriptions and stories told by the program clients, but also as descriptions told by the junior staff, along with their observations. At this point, the second abductive stage had begun (or, better, the process of retroduction).

As stated above, *retroduction* is the name given by Peirce to the process of carefully checking our working hypothesis against all facts, and in his words: examining the hypotheses on probation, testing their ability to stand up to logical criteria and to fit the data, resulting either in eliminating the hypotheses or building an empirical generalization (Rescher, 1978). Here, according to Peirce, we must use accepted criteria for checking the validity of the hypothesis. By this, he means the same logical structures we use to examine a hypothesis by a process of deductive derivation (*modus tollens*, hypothetical syllogism, disjunctive propositions, syllogism, etc.) (Copi, 1961).

This is not the same as in deduction, where the logical derivation goes from a theory to the assumptions and then to the field or research design in which the *theory* is to be examined. In abduction, the ‘logic of discovery,’ this technique is used to examine the logical structure relating to the *facts* (our findings). We go from the observed facts, from the data, to generalization and not from the theory to specific instances. Peirce (1955a) calls this examination process “retroduction” because it is the opposite of deduction.

The retroductive process, the process of checking our working hypothesis against all our observations, is an ongoing process of *presentation of data* gathered in the field, *presentation of explanations* of these data (explanations that are convert to become *a hypothesis on probation* because they have not yet been examined and verified), and an examination of *their logical connection* in such a way that *all the findings derive logically from the explanations*, as can be seen from the following illustration.

Retroduction

Findings
↓
Explanation
↓
Hypothesis on probation
↓
Logical inference process
↓
Examination vs. more findings
↓
A more generalized explanation > and then, if possible, to a theory

Deduction

Theory
↓
Logical inference process
↓
Hypothesis
↓
Choice of field and examination of the theory
↓
Findings (verifying, refuting or refining the theory)

So, a quick reminder: the first “surprising fact” in our study of women migrants from the Caucasus was the first piece of evidence given to us by the program’s managers and senior staff, telling us that the women were “regressing” in terms of the process of change toward integration in the host society. Our first explanation was that the ambivalence of the senior staff created a double message that confused the women. Considering the cultural suspicions, we decided to let the junior staff to collect as many stories and descriptions as they could—told by program clients (the women) about their lives in Israel and about the program.

Our second step was to convert our explanation into a hypothesis on probation (i.e., were the program’s clients confused by the staff’s messages?) and to examine it against new data: the stories and the descriptions—data that have the potential to bring some surprising new facts for us to deal with. We did that in small groups made up of a representative of the evaluation team and people from the program. In each group, we read the stories and the descriptions. When translations were needed, they were done

on the spot by the staff. Each member of the group wrote his/her assumptions or impressions of what we heard, and then we looked at what we had.

I will not discuss the analysis process itself because it is not relevant here (examples of such a process can be found in Levin-Rozalis, 2004a, 2004b, 2006). But in the end we had three main themes that were composed of contradictions: strength (initiative) versus weakness (passivity), Israeli woman versus Caucasian woman, past versus present (Levin-Rozalis & Meinrat, 2007; Meinrat, 2002). Looking farther into the findings, we saw the internal connections between these three themes. In the stories about the past, there was a clear connection between Israeli women and qualities such as strength, initiative and independence, with the Caucasian woman portrayed as weak, dependent and passive. It was, as a matter of fact, a clear dichotomy. But we could not find the same dichotomy in the stories and descriptions that dealt with the present. Another phenomenon attracted our attention. Expressions of shame and submissiveness occurred in many of the stories about the past, but were totally absent in the stories about the present. We could find an explanation for that: as time passed, the women gained greater self-esteem and the distinction between being an Israeli and being a Caucasian grew fainter—as did the feelings of shame and submissiveness. But that was not enough. It was a banal explanation, and more than that, it did not explain the phenomenon of going back to tradition that seemed to become more salient as time passed. We could not stay with this explanation because, as Peirce taught us, our explanation must fit *all* our findings.

From the beginning, we tried to learn more about this community, we read the

literature and interviewed some experts, but we could not find answers there. At this point, we decided to try to unravel the life situation of the women during their first stages in Israel. We spent many hours talking with the program staff, learning about that period. We also wanted to learn about the staff members' own experience as newcomers several years previously, and we went back to the stories and descriptions that we already had about the past.

The picture we ended up with was very complicated. During the first days and months in Israel, the women's situation was not only what could be expected from an immigration process, but it was also a major identity crisis. These women found themselves without a relevant language, without their community, without an adequate job or the possibility of finding one (due to language problems and lack of familiarity with the market structure in Israel). What they did have were their traditional norms (which did not suit a highly industrialized Western society) and a growing feeling of estrangement. Their own culture, language, customs, values and norms were no longer a sound foundation for life but, rather, a source of difficulty, resentment, rejection and shame. The messages that they got everywhere were that they had to change, to adopt norms that were against their culture and everything they were accustomed to. The choice presented to them was an "either-or" choice: to abandon their past identity of traditional women (who are passive and acceptant in a culture where the family, husband and children are the top priority) and to adopt the behavior and norms of the "Israeli woman" (i.e., to show initiative, to be independent, to wear modern clothing and so on) and in that way to regain their status and find more suitable jobs and

social acceptance. The alternative was to stick to their own culture and remain economically and socially marginal. This difficult dilemma caused the women to perceive the world in a dichotomous way: Israeli woman vs. Caucasian woman. It was a trap that led them nowhere.

Paradoxically, the program, in enhancing their self-esteem, using empowering group processes, helped them to overcome this dichotomy and gave them the courage to go back to their cultural origins. It was a magic cycle. When they were able to reconnect to their culture, it gave them strength to change. The more strength they gained, the less they needed to abandon their culture. Toward the end of the program, they were able to stand on their own two feet, with one foot in their own culture and tradition and the other in Israeli society.

Going back to the literature on immigration, we found support for our explanation (e.g., Berry, 1990). One cannot be cut from one's own roots, we explained to the program managers. What they thought of as regression was really a symptom of strength, a symptom of the women's ability not to abandon their own tradition—in spite the messages they got from their surroundings—and to create a new identity that combined both the Israeli culture and their own. They were able not to give up either of them and to gain from both.

This explanation fit all the observations we had, all the data. It explained all our findings and also taught us and the program managers to think and work differently.

Without the logical validation to verify the abductive hypothesis, this interpretation would have been perceived as far removed from reality. A presentation of only the facts would have led to the incorrect conclusion that the

program had not achieved its objective: to help the women to be part of mainstream Israeli society. Only a combination of these two elements could provide the whole picture, which was both verified by the facts and logically validated. It was then also validated by existing knowledge from other sources.

When this process has been completed, the evaluation's findings are accorded greater importance and weight. No longer is it the evaluator's intuition that must, to paraphrase House (1980), persuade rather than convince, be more creative than investigative; rather, it is the explanations that provide a theoretical argument (proposition) and which stand the test of logic—both in the test of the facts and of congruence with existing knowledge. The argument is reinforced in two ways: through logical validity (as in deduction, due to retroduction) and verification of empirical facts, for the facts are the point of departure. If the evaluation's explanations stand the tests of logic and the facts, and are therefore propositions, they are certainly worthy of being considered a stage in the research process—just like the discovery process—that contributes to the body of scientific knowledge.

By adopting the processes and criteria that Peirce offers us, we can reconnect evaluation to research, not as “inconsequential” research but as a field where the innovation and initiation of knowledge is similar to that of the process of discovery. Moreover, evaluation deals with knowledge of a kind that social research finds difficult to contend with: not generalized theoretical arguments but knowledge stemming from the field, reality and the world. It is therefore more chaotic, unpredictable and replete with variables and events. On the one hand, Peirce's approach enables us as evaluators

to formulate knowledge that meets the criteria of research and enables continued testing and investigation; on the other hand, it loses none of its uniqueness, with which it successfully contends with a multitude of phenomena, unknown diversity and a connection to concrete reality.

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