CHAPTER 6

A CORE PROBLEM WITH HUMAN DATA PROCESSING: EPISTEMIC CIRCULARITY IN ACTION

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Abstract

Managers are expected to solve critical problems of our society in an efficient manner and in ways so that the problems remain solved. In order to accomplish this, the managers are provided with vast amounts of resources including mountains of data and a wide variety of problem-solving methods available. On the other hand, the effectiveness of social and organizational problem solving is far from satisfactory and this lack of effectiveness is ubiquitous. One reason for this ineffectiveness we claim has to do with how the human mind works. The inherent capabilities and limitations of human mind coupled with social-cognitive skills lead to sub-par problem-solving. An especially counterproductive problem-solving approach used by managers is setting and attempting to solve problems using erroneous cognitive skills that not only fails to include relevant data but also uses the existing data in a counterproductive manner. The very data processing skills of managers make problem-solving a dead end for the actors involved at great cost to them and to the society. This chapter looks at a core human data processing problem that renders the available data and techniques ineffective. Epistemic Circularity disregards all the disconfirming or threatening data and fails to include it in the problem solution. Epistemic Circularity thus renders the relevant data useless in developing effective solutions. Easy knowledge, a product of epistemic circularity, leads to ineffective problem solving which in many cases result in exacerbated problems and counterproductive consequences.

Keywords: Epistemic Circularity, Managerial problem solving, Difficult problems, Data dismissal, Knowledge loss

Introduction

All human beings require information about their environment in order to survive and flourish. Norbert Wiener wrote "the world may be viewed as a myriad of To Whom It May Concern messages" (in Watzlawick, 1977). These messages construe the data that can be harvested for constructing theories that explain how the world works and how we should act in order to survive and flourish in this world. One of the main goals of our cognitive mechanisms is to maintain an accurate representation of our environment, at least the relevant aspects of it (Sperber & Mercier, 2017). The data chosen for constructing, testing and utilizing our worldviews in turn depends on the theories we have in our minds. As Einstein stated, "it is the theory which decides what we can observe" (in Heisenberg, 1972). Thus, there is a continuous circular process in action. In this process, data is used to feed, test, affirm or disconfirm our theories and these theories are used to construct our behavioral worlds as well as decide which data is chosen and how it is utilized.

In order to act effectively and solve problems in persistent and productive ways this circular reasoning process itself must be productive. A productive process uses hard, valid data and makes explicit inferences. Premises in a productive process are explicit and the conclusions are publicly testable (Argyris, 1991). Using productive reasoning processes is especially critical when working with social world problems characterized by their uniqueness, uncertainty and instability (Friedman, 2001) where the available data is mostly ambiguous and scattered and information is mostly vague, inconsistent and incongruent (Argyris & Schön, 1978).

Paradoxically, in practice, the main role of reasoning is not to motivate us in reaching grounded conclusions but to explain and justify existing or after the fact conclusions and beliefs (Sperber & Mercier, 2017,p.121). This paradox is caused by the limited information processing capacity (Simon, 1994) as well as the cognitive and social skills of human beings (Argyris, 1993).

Information processing capacities of the human mind makes it impossible for a single mind to gather, process and utilize all the required data (Knight, 2014). Based on empirical studies Simon (1971) asserts that the human mind constructs a reality with what limited information it gathers. On the other hand information systems used to manage gather and present information enough to override human data processing capabilities (Ackoff, 1967; Eppler & Mengis, 2004). This data flood swamps the decision-maker and reduces the likelihood that the managers will make informed decisions (Argyris, 1987).

One way managers reduce the likelihood of making good use of data in making informed decisions is when they use reasoning processes that dismiss data that can potentially challenge or disconfirm their erroneous assumptions and perspectives regarding the situation at hand. Kahneman illustrates that even if actors have access to information that contradicts with their beliefs, they can elect to disregard such information (Kahneman, 2011). Epistemic Circularity is a good example of how managers reason in ways that inhibits effective problem solving.

After providing a definition and example for Epistemic Circularity, I will illustrate how Epistemic Circularity leads to erroneous Easy Knowledge used by managers to solve the problems in ways that fail to solve the problems effectively and hide the source of ineffectiveness.

1. Epistemological Circularity

Epistemic Circularity is a kind of cognitive bias (fallacy) in which the reliability of a source of belief or conclusion relies on premises that are themselves based on that source (Lammenranta, 2006). When the reliability of a belief-source such as perception, intuitive reason, introspection, memory or reasoning is established based on the very beliefs produced by the same belief-source rather than the belief is said to be epistemologically circular (Bondy & Delaplante, 2011).

One example of epistemically circular arguments is a track-record argument as in follows (ibid). Suppose S1 is a belief source such as perception, reasoning or memory and an actor wants to find reasons for the reliability of his or her belief-source S1 using the following inductive argument.

S1 formed a perceptual belief p1 at t1 (a given time) and p1 is true

S1 formed a perceptual belief p2 at t2 and p2 is true

S1 formed a perceptual belief p3 at t3 and p3 is true

S1 formed a perceptual belief pn at tn and pn is true

Therefore, my belief source S1 is a reliable source of belief

Since the premises (p1..pn) formed by the use of the very faculty whose reliability the actor is trying to establish, the argument is circular. In an epistemically circular argument, the reliability of a source of belief is defended by relying on premises that are themselves based on the very same source (ibid.).

Coined by William Alston (1986), Epistemic Circularity points out that the basic sources of beliefs such as perception, introspection, intuitive reasoning, memory and reasoning are

reliable except by using epistemically circular arguments. Contemporary accounts of knowledge and justification that enables us to gain knowledge and justified beliefs are based on such arguments. Using epistemic circularity allows us to know the premises of an argument which is epistemically circular even without knowing the conclusion and using the argument leads to the knowledge of the conclusion (Lammenranta, 2006).

Bergman provides the following Juror case as an example epistemic circularity:

> *Juror #1: You know that witness named Hank? I have doubts about his trustworthiness.*
>
> *Juror #2: Well perhaps this will help you. Yesterday I overheard Hank claiming to be a trustworthy witness.*
>
> *Juror #1: So Hank claimed to be trustworthy did he? Well, that settles it then. I'm now convinced that Hank is trustworthy (Bergmann, 2006, p.180).*

In this case, the Juror #1 takes Hank's claim that he is reliable as evidence of Hank's reliability. However, without an independent reason and publicly verifiable evidence that leads us to believe Hank is reliable there is no reason to trust any of Hank's claims let alone his claim that he is reliable (Bondy & Delaplante, 2011).

Knowledge acquired through epistemic circularity is called "easy knowledge." It is the knowledge that is produced using processes whose reliability is justified with the process itself. In the example above, Juror #1's belief that Hank is a reliable witness is easy knowledge.

Leaving philosophical discussion regarding problems with easy knowledge such as its dialectical ineffectiveness to others (Jenkins, 2011; Schmitt, 2004; Van Cleve, 2003; Vogel, 1987), here will illustrate some practical problems in everyday organizational life.

2. A Managerial Problem-Solving Case

This actual case is about a manager who had tried to correct the problematic attitude of his subordinate engineer numerous times. The manager frames the problem as the subordinate being lazy and irresponsible and had several attempts to rectify the situation. Frustrated with his inability to "set him straight" this case illustrates his one last attempt to solve the problem.

The case is written using the left-hand case method developed by Chris Argyris and his colleagues (Argyris, Putnam, & Smith, 1985; Argyris & Schön, 1978). The case captures how the actor frames a problematic situation, what is his strategy to go about solving the problem and the actual dialogue as well as the thoughts and feelings during the solution attempt.

When writing the case, the manager provides an explanation of the problem (Question1) and the strategy he or she used to solve the problem (Q2). Then as in a script, he writes the actual dialogue (Q3) on the right-hand side column. The thoughts and feelings that are not communicated during the dialogue are written on the left-hand column. Left hand column provides data about the reasoning and self-censorship processes during the actual dialogue.

Table 1: Left-hand case. An attempt to solve a problem

Q1: In one paragraph, provide some context for the problem. What is the problem? Who is the other actor?

(1) One of my subordinate engineers (S) has been very lax in his attitude. (2) He is an irresponsible guy who always neglects his duties. (3) His irresponsibility is affecting all the team in a negative way. I am sick of his attitude.

Q2: What is your strategy to resolve a problem? What do you want to achieve while dealing with this problem?

(4) I talked to him dozens of times and tried to get him to act responsibly. I clearly explain his duties and how important it is for all of us that he shoulders his share of responsibility.
(5)Whenever I talk to him, I try to clarify his responsibilities and get him to act.
(6) He always says he will get his act together, but he never delivers.

Q3: What happened when you spoke with the others?

My uncommunicated thoughts and feelings	**The conversation**
(7) You are just avoiding my question.	**Manager (M):** (8) Why didn't you fix the (clients) problem equipment? **Engineer (E):** (9) His equipment is fine.
(10) You are still dodging my question.	**M:** (11) But, they still complain. **E:** (12) They are always like that; complain just for the sake of it.
(13) You did not even see the equipment.	**M:** (14) But I confirm that they have a problem, didn't you see the equipment? **E:** (15) According to their claim
(16) I am going to blow my top	**M:** (interrupting him**):** Hold on! Hold on! Hold on! (17) Their claim?!
(20) Oh my God!	(18) Have you ever seen the equipment? **E:** (19) I was about to go to their site. **M:** (21) You are joking right?
(23) I knew you would say that.	**E:** (22) My other work has just finished **E:** (24) Which one? **O:** (25) (the other clients)
(27) You never do it right.	**M:** (26) You didn't finish that until now? **E:** (28) It was a greater problem that we anticipated. **M:** (29) Yes, It is always a bigger problem with you. **E:** (30) You know; you can help me. **M:** (31) Sorry, cannot do that. **E:** (32) Why not? **M:** (33) It is not my job, it is your job. **E:** (35) Okay, there's no need to shout at me. I am going as we planned. **M:** (36) I am coming with you.
(34) I would help you if I could ever believe that you are sincere and serious.	**E:** Look at that! (37) The equipment is configured incorrectly. **M:** (38) See, (the client) could not use critical equipment for such a ridiculous reason. **E:** (39) Next time, I will be faster.
(40) I wish, I only wish	

3. Analysis

3.1. Ladder of Inference

When analyzing the case data, the ladder of inference is used. The ladder of inference is a conceptual tool that schematically represents how human beings select data from their environment and make inferences (Argyris et al., 1985, p.57). The process of selecting data and imposing meaning to the selected data is mostly an automatic process and works beyond the consciousness (Senge, 1990).

The first rung of the ladder consists of the relatively directly observable data which can be recorded with a video or tape recorder. In our research, these are the recorded conversations as well as the written documents. This is "hard data" because regardless of what they believe, parties can agree on what the data is. The second rung represents the inferences made about the meanings embedded in the words. This inference process occurs often in milliseconds regardless of whether they agree with the meanings. Then people impose their own meanings on the actions that they believe the other person intends (Argyris, 1993, p.57). People make attributions which are causal explanations about others' intentions or goals. Or they make evaluations of the effectiveness of the behavior.

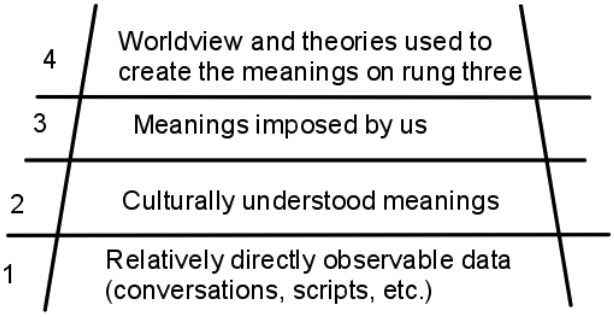

Figure 2. Ladder of Inference. Adopted from Argyris (1993)

In the next step (rung 3) the actor imposes his own meaning on the actions he believes the other person intended. He attributes intentions to the other person or evaluates his actions or intentions against his own -mostly tacit- criteria.

When going up on the ladder of inference the inferences, meanings, judgements and conclusions get more abstract and brief. A great amount of data that can be interpreted in a number of ways is summarized in service of brief conclusions. This requires testing the conclusions and inferences in each step with the other party. Otherwise the further steps will be wrong or untested conclusions. Using such an approach is enacting the basic scientific rule

"beginning with data independent of the observer and testing all inferences" (Burns & Okey, 1985; Lederman, Schwartz, Abd-El-Khalick, & Bell, 2002) in interpersonal, social contexts.

The case in this chapter provides many examples of the usage of the ladder of inference during the interaction. For example, the engineer's answers to the superior's question (sentence 9: "his computer is fine") is the hard data of the case and is on rung 1. The superior imposes his own meaning to this answer and thinks "instead of addressing my concern he is talking about the equipment." Culturally, replying with some other thing instead of answering the question can be understood as avoiding a subject (rung 2). When the engineer answers the uttered question (sentence 8) instead of answering the real and unuttered question (which is his irresponsibility) the manager imposes the meaning "trying to dodge my question" (sentence 7) (rung 3). Then the manager causally explains all the engineer's actions with his attitude and character and evaluates him as lax and irresponsible.

3.2. Analyzing the Data and Reasoning Process

In this problem-solving case, the main source of data and information of the researcher is the manager. Since both the researcher and the manager are subject to distortions of data and a number of biases (Robinson & Lai, 2006) it is critical that data and information is checked independent of the reasoning of the provider. The hard data in this case is the utterances and quoted thoughts and feelings of the clients.

In the analysis of the case, the focus consisted of three initial questions. Does the client's reasoning process contain all the relevant data provided by the client himself? Does the data explain what the client claims is happening? If the answer to first and second questions are negative, then what are the consequences?

One important set of information the researcher surfaced during the interview with the manager is related to the history of the problem. The following excerpts are the attempts by the researcher to reveal more related data.

Table 2: An excerpt from the interaction between the researcher and the manager	
Researcher (R): (in our talk) you stated that this problem has been going on for some time and you said that you attempted to get him straight several times. Do I remember correctly?	Checks if the data he recalls is true.
Client (M): Yes. I talked to him maybe dozens of times.	
R: Is it fair to say that this (written) case is an example of those "dozens of times" of your talk?	Confirms the data
M: Certainly. There are some little differences, but it is all the same. He never gets his act together.	Checks whether his inference is valid.
R: Do you remember the first time you talked to him? Was it in any way different from this (written case)?	Confirms the data.
M: No, no. It was related to his irresponsibility again. I never saw him taking charge of his job.	
R: What I am trying to find out is how did you initially reach the conclusion that this guy has a "lax attitude" and is "irresponsible?"	Explains his intention. Tries to get at the data that constitutes the basis for the manager's inferences
M: Believe me with this guy it is always like this. It was, again a similar incident like this. The client complained that there was a problem and it was related to him. It is this guy that is the problem.	Does not provide the data. Repeats his initial belief.

The client claims that the problem is the engineer himself. That is, he explains the problems through attributions about the personality or attitude of the engineer. The following questions seeks data that would disconfirm this claim by through data indicating that other engineers are also prone to similar problems.

Table 3: An excerpt from the interaction between the researcher and the manager	
R: Do other engineers, if you remember, have similar problems with the clients similar to this incident? And I am asking this question because I am trying to understand what is it that he does or says that leads you to believe that the problem is "in" him and not related to some other circumstances.	*Asks for data* *Shares his intent.*
M: Of course. Ours is a sensitive operation and since we are building custom solutions to changing requirements, we have many similar cases. It is part of the job.	*Provides data.*
R: If similar cases happen with other engineers, what makes this engineer in your view different? If the problems (as shown in this case) are common occurrences with other engineers, what leads you to conclude that this particular engineer is "irresponsible?"	*Asks for data*
M: Believe me he is irresponsible. I know this guy and I talked to him dozens of times. He is plain lazy and just won't change.	*Provides self-referential conclusions.*

4. Epistemic Circularity in the Manager's Reasoning and Actions

As revealed during the interview, whatever event happened led the manager to conclude that this particular subordinate is lazy and irresponsible also happens with other subordinates, but he does not label them as lazy and irresponsible. The directly observable data that is available from both cases and the recordings can be interpreted in ways that show the engineer is responsible or at least doing what he can, given the situation, in order to fulfill his duties or

having the same problems as other engineers. So far, the manager has not provided any conclusive data that can lead others to conclude that this specific engineer is irresponsible or lazy in an independently verifiable way. However, this lack of supporting data and occurrences of similar cases with other engineers that indicates the problems are not exclusive to this particular engineer does not lead the manager to refute or review his beliefs about the engineer. It seems that the only supporting evidence of his beliefs are his beliefs. In this case it can be concluded that the manager's reasoning is epistemically circular.

It can be hypothesized that the reasoning process is somehow triggered by some action of the subordinate, but the manager seems unaware of what particular set of action triggers it. In addition, he is unaware of the reasoning process that leads him to his current conclusions and actions. Here is a manager who has a strong belief explaining the subordinate's behavior while being detached from his own reasoning process upon which the belief is based on. Bavelas's research shows that once a tentative explanation has taken hold on one's mind, information to the contrary does not lead to corrections but to more elaborate explanation of the conclusions (in Watzlawick, 1977). This is an expected consequence of epistemic circularity.

Based on the interaction between the manager and the engineer, a partial map of the manager's epistemically circular reasoning can be drawn.

Table 4: A partial map of the ongoing problem

How the Manager thinks	**How the Manager acts.**	**Consequences**
Manager believes that the engineer is irresponsible and lazy. Manager believes that the engineer doesn't understand that he is the problem. Manager believes that he should set the engineer straight. The basis for the manager's beliefs is that he believes that the engineer is irresponsible. The manager's previous attempts (which are same as this one) prove that he is right.	He acts based on his beliefs. The manager doesn't explain how he reasons about the situation. Hides his beliefs. Acts as if he is not doing so. He asks questions and uses the engineer's answer to confirm his (unrevealed) conclusion that the engineer is irresponsible.	The engineer has no access to the manager's reasoning and knowledge to take informed action. The errors continue to exist. The same situation repeats itself. Manager's beliefs are reinforced. Manager's frustration accumulates.

Based on the data regarding the interaction between the manager and the engineer the following hypothesis are set. These are similar to hypothesis used in existing research (Schön & Argyris, 1992):

1. As the manager tries to control the actions of the subordinate and control and censor the feelings of the subordinate then subordinate will possibly feel controlled or he is in a win/lose situation.
2. As the manager tries to hide his feelings and thoughts unilaterally in order to save face but fails to hide them then the subordinate will probably feel that the manager is hiding something and acting defensively.
3. As the manager controls the situation and the task then the subordinate will feel little freedom of choice and internal commitment.
4. The manager is going to claim that the subordinate does not understand the situation or that the subordinate understands what he (the manager) is trying to say but acts as if he did not understand.
5. If the self-feeding, self-reinforcing vicious circle keeps going, then the accumulated stress and frustration will possibly lead to the termination of the engineer's job.

Differing from the managers reasoning that leads him to believe that the engineer "is" the problem, I believe that in addition to the reasoning processes of the manager (and engineer), this pattern of interaction is causally responsible for the counterproductive problem-solving process. For further discussion one can refer to (Argyris, 1993; Dent, 2003; Friedman, 2001; Watzlawick, Beavin, & Jackson, 1967; Watzlawick, Weakland, & Fisch, 2011).

5. Consequences of Epistemically Circular Reasoning and Action

An important part of the analysis is finding out the consequences of the reasoning of the participants and the interactions for the problem. The consequences may be intended or unintended by the client. If there is a mismatch between the intended consequences and the actual consequences, this signifies an outcome gap (Rudolph, Taylor, & Foldy, 2001)

5.1. Consequences for the Manager

There are some interesting consequences for the reasoning of the manager. Firstly, the stated goal of the meeting in the case is to get the subordinate to understand the "situation" and take responsibility. However, neither this meeting nor the previous ones achieved this

goal. This is a fundamental ineffectiveness in the core organizational processes which is managerial problem solving (Mintzberg, 2005)

Secondly, the manager feels frustrated, but he tries to suppress his negative evaluations and feelings about the engineer. This makes it difficult for him to genuinely test these evaluations and the sources of feelings because in order to genuinely test these he has to reveal and discuss them and make them testable. A genuine test is one that can actually disconfirm these ideas (Popper, 2002).

Argyris observes that one of the most frequent strategies used when trying to tell the other of his poor performance is to ease-in (Argyris, 2010, p.44). Easing-in is a strategy used when attempting to avoid the threat associated with direct confrontations that have the possibility of escalating. The actor using easing-in strategy tries to get the other to understand what he is actually trying to get at. The actor using the strategy is tacitly saying, "I want you to understand something but if I say it directly, I am afraid that the problem will escalate. So, I will ask you some questions and if you give the 'right' answers, you will understand what I am hiding." Argyris (ibid.) claims that this strategy allows the principal actor to show concern to the other. However, in doing so he covers up his actual views, acts as if he is not doing so and creates an interaction based on the rule "threatening issues as well as negative feelings shall not be addressed openly!" The subordinate also has to cover up his actual feelings and acts as if not doing so. This ensures that the erroneous reasoning processes and conclusions and assumptions are not checked.

Such a strategy contains several risks. Firstly, the strategy relies on the engineer to be willing to give the "right answers." When the subordinate fails to provide the right answers, the manager gets frustrated and angry for both the initial problem and for his lack of understanding.

Another critical risk is by using this strategy: the manager hides what he is trying to achieve and acts as if he is not hiding anything. Even though the engineer understands that there is something hidden going on, he will not be willing to discuss something that his boss made undiscussable.

5.2. Consequences for the Engineer

Based on the data, it is possible to predict that the subordinate will fail to take responsibility because he does not have access to the "actual" problem since the manager hides it and makes it undiscussable. Now the engineer is in a "double bind" (P. Watzlawick et al., 1967).

If he takes the correct action, it is because the manager pushes him not because he takes responsibility. If he keeps doing what he has been doing then he causes problems to himself and to his manager. In such a situation there is no way the engineer can prove that he can act responsibly. The only way he can get escape this double bind is for either the engineer or the manager to make what the manager made undiscussable discussable.

5.3. Consequences for the organization

In order to be effective, the problem-solving efforts should be based on valid data and sound processes (Hasenfeld & Furman, 1994). The organizational problem examined in the case above is based on ambiguous data and fuzzy logic. Furthermore, the manager's solution attempts until this date not only failed to solve the problem but also aggravated the problem by reinforcing his beliefs and increasing his frustration. As the problem situation repeats itself the manager has the more "evidence" confirming his beliefs thus his beliefs about the engineer are reinforced. But as we have seen these beliefs are based on erroneous reasoning and fuzzy data. This results in a "self-sealing" process. Self-sealing processes are "conjectures that cannot be refuted" (Paul Watzlawick, 1977). But Popper has shown that refutability is one indispensable condition for scientific explanation (Popper, 2002) and sound reasoning. In such a self-sealing process which uses epistemically circular reasoning, the assumptions and beliefs of the manager regarding the problem are reinforced no matter what.

As illustrated in the case, the engineer has no way of refuting the assumptions and beliefs of the manager because they are either hidden from the engineer. The manager either does not reveal his attributions about the engineer by keeping these attributions on the left-hand column or he communicates them in ways that make them undiscussable and the undiscussability undiscussable (Argyris, 1988). No matter what the engineer does he will fail to change the manager's view.

For example, the manager thinks that he would help the engineer if he believed that he was sincere and serious (34). But by keeping this in his left-hand column private he covers it up and act as if he is not doing so. The engineer do not have access to this thought. Even if he had access he had to learn how he could prove that he is sincere and serious. Thus they are trapped in circular process of their own making (Argyris, 2010).

The manager in this case is trying to solve a problem, which in the given context, is very real and has dire consequences for the organization. In his interactions with this engineer and others with whom he is having similar problems, the manager is affected by the accumulated stress. Whenever a similar problem comes up the issue deepens. Usually such problems are never solved until one of the parties has had enough.

6. Conclusion

Managers trying to solve difficult problems containing ambiguous data which actually or potentially refutes their conclusions, usually neglect or disregard such data and use knowledge based on epistemic circularity. This results in getting trapped in misdiagnosed problems that has great cost it terms of time, energy and focus (Senge, 1990). These traps decrease the quality of life in the organization as the mental effort of organization members is spent on these problems (Schwarz, 2013). The behavioral world around difficult problems in an organization with such traps turns into a swamp (Razer & Friedman, 2016). The relevant data is dismissed and lost in this swamp.

Epistemically circular processes swallow significant amount of data and lead to organizational vicious cycles. In order to be able to access, contain, process and utilize all available data, managers need to obtain the required socio-cognitive skills that will enable them to critically look and reflect on their reasoning and problem-solving processes. If utilized, the data wasted in those vicious cycles can play a critical role in developing a rich understanding and overcoming the difficult and complex organizational and social problems. Managers who learn the skill of overcoming circularity and develop productive data processes can turn difficult and disconcerting data into productive resources.

Research shows that while it is difficult to change the way one reasons or sees the world, it is not impossible (Arieli, Friedman, & Agbaria, 2009; Le Fevre & Robinson, 2015; Wolfberg & Dixon, 2000; Wright, 1962). In order to better utilize the available data and information the actors must first become aware of how their reasoning works and be able to "see" and contain the data they have been dismissing. Becoming aware of this previously dismissed data, that potentially or actually disconfirm their "easy knowledge", opens the path for producing more valid information regarding the reality and the situation thus enabling effective and responsible action.

There are a number of approaches that prove useful. Argyris intervened in organizational systems to get the actors to see the symmetrical inconsistencies and injustices in their reasoning and actions (Argyris, 1982, 2004, 2007). Razer and Friedman surfaces the emotional component that leads to exclusive relations and blindness towards disconfirming information by attempting to provide alternative interpretations of the actual actions (Razer & Friedman, 2016). Such alternative interpretations may enable the actor an emotional relief and open the possibility of adopting a more productive stand. Rudolph et al. teaches the actors to see that reality is not an objective truth but a constructed phenomenon, that they are causally responsible for the

consequences in this constructed behavioral world and if they can reflect and change their 'frames' and actions they can alter the consequences they produce (Rudolph et al., 2001). Robinson helped educators improve their practice by becoming aware of their tacit constraint sets and develop more coherent and effective practices (Robinson and Lai,2006).

Watzlawick once claimed that ''The Situation is Hopeless but not Serious'' (Watzlawick, 1993). When observing efforts that produce actionable knowledge which enables productive change in social systems based on valid data, I came to believe that the situation is serious but not hopeless.

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