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Between Rumour and Truth
The Walkerton Crisis and Public Inquiry

By:

Adam Fiser, B.J. (Highest Honours).

A thesis submitted to
The Faculty of Graduate Studies
And Research
In partial fulfillment of
The requirements for the Degree of

Master of Arts
Department of Sociology and Anthropology

Carleton University
Ottawa, Ontario
May 2002

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**The undersigned recommend to the Faculty of Graduate Studies
and Research acceptance of the thesis**

**Between Rumour and Truth:
The Walkerton Crisis and Public Inquiry**

**Submitted by Adam Fiser, B.J (Highest Honours)
In partial fulfillment of the requirements
For the Degree of Master of Arts.**

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May 7, 2002

Abstract

This project addresses the Walkerton water crisis and the Public Inquiry that emerged in its wake. It models how cognitive contexts for processing information interfere with the way organizations coordinate in controlling a situation (cf. Dewey 1938, Goffman 1974, Tversky & Kahneman 1974, Lyotard 1983, Boudon 1998, Bowker & Star 1999, Sternberg et al. 2000).

In this case, Walkerton's ground water system became a crisis situation because the coordinating organizations that formed its defensive network failed to commonly identify and prevent the causes that led to bacterial contamination. However, I do not merely trace the Walkerton Inquiry to summarize where each organization's information process failed to match reality. I use the inquiry to examine how related organizations represent and reconfigure their activities to defend and/or adapt their concept of causality in light of failure (cf. Deleuze & Guattari 1987, Cosmides & Tooby 1994, Clancey 1997).

Moreover, I reflect upon the ontological domain of inquiry (cf. Dewey 1938) and propose that it is a necessary dialectical process between formal systems of truth that guide an organization's operating procedures and informal systems of rumour that mutate an organization when procedures fail. I contend that inquiry offers a position for human organisms to ask 'what happened?' and build consistent organizations despite uncertainty.

Acknowledgements

The Walkerton crisis brought tremendous suffering and anxiety upon the town's residents. At the very least this project is dedicated to their tenacity in overcoming tragedy. Praise must also be delivered to all the technicians, clerks, counsel members, and researchers who helped Justice O'Connor realize the ideal of a Public Inquiry that is truly accessible to the public.

Thanks go out to my advisor Rob Shields for his theoretical imagination and uncompromising quest for new worlds within sociology. If I had not encountered Prof. Shields during a second year undergraduate course in social theory, there is no doubt that my interest in sociology would have remained dormant. I also owe a debt of gratitude to my secondary advisor Barry Rutland whose exquisite sense of discursive structure and rhetorical skill is an inspiration for students attempting new forms of theoretic expression.

Although all mistakes and malformed phrases are my own, this project would have remained a mere idea without the vital support and conversation of Karina Griffith who is my future. I also owe an unfathomable debt to my parents, Paul and Ilona Fiser whose incredible generosity secured my existence and offered me a chance to experience university life.

Special thanks go out to Epistemon for confirming my suspicion of academia. Perhaps one day the 'occident will be east'.

Table of Contents

Abstract:.....	iii
Acknowledgements:.....	iv
 Introduction: 1	
Intention:.....	2
Method:.....	5
Objects of Analysis:.....	6
Tools:.....	7
Navigating the Project:.....	10
Apology:.....	11
 Chapter 1: Crisis	
The Tragic Archetype of Politics, Towards Inquiry:.....	16
 Chapter 2: The Players	
The Political Prototype of Inquiry:.....	29
The Emergence of Deliberate Inquiry:.....	37
 Chapter 3: Inquiry as Dialectical Process	
Encounter:.....	40
Dialogical relations, Deliberative style and Analogical networks:.....	44
What kind of subjectivity does E. coli mobilize?.....	49
 Chapter 4: Introducing a body	
General:.....	54
Specific:.....	59
 Chapter 5: Two Labs	
Introduction:.....	72
Methodology:.....	74
At the Lab or ‘Two ways for doing the same thing’:.....	82
The Technician:.....	88
 Chapter 6: Encounters of Agency	
Aspectual Prioritization and Inquiry:.....	93
Organizational Memory:.....	96
Agency:.....	104

Technology:.....	127
------------------	-----

Chapter 7: Coordination and Games of Exchange

Games:.....	133
The Will and games of organization:.....	137
Inside the MOE:.....	144
Games of coordination stabilizing the MOE:.....	148

Chapter 8: Plausible Inference and Uncertain Networks

The Sentence and its Organization:.....	166
Truth and Plausibility:.....	171
Simulation:.....	173
Rumour:.....	177
Predation and Intelligence:.....	191
Styles of Reasoning:.....	194
Art and Science:.....	200
A question of causality:.....	202
Conclusion:.....	206
Implications:.....	210

Appendix 1

Tabular Summary of Project

Introduction:

Intention:

This project addresses the Walkerton water crisis and the Public Inquiry that emerged in its wake. It models how cognitive contexts for processing information interfere with the way organizations coordinate in controlling a situation (cf. Dewey 1938, Goffman 1974, Tversky & Kahneman 1974, Lyotard 1983, Boudon 1998, Bowker & Star 1999, Sternberg et al. 2000). In this case, Walkerton's ground water system became a crisis situation because the coordinating organizations that formed its defensive network failed to commonly identify and prevent the causes that led to bacterial contamination.

However, I do not merely trace the Walkerton Inquiry to summarize where each organization's information process failed to match reality. I use the inquiry to examine how related organizations represent and reconfigure their activities to defend and/or adapt their concept of causality in light of failure (cf. Deleuze & Guattari 1987, Cosmides & Tooby 1994, Clancey 1997). Moreover, I reflect upon the ontological domain of inquiry (cf. Dewey 1938) and propose that it is a necessary dialectical process between formal systems of truth that guide an organization's operating procedures, and informal systems of rumour that mutate an organization when procedures fail. I contend that inquiry offers a position for human organisms to ask 'what happened?' and build consistent organizations despite uncertainty.

Yet, consistent procedures do not guarantee absolute environmental control. Agents become aware of problems when the ontological domain that normally anticipates 'what happens' to their organization fails to disclose adequate procedures for manipulating emergent forms. Subtending the awareness of problems is a tenuous relation between what agents believe is truly happening and what may actually be

happening. Agents verify truth procedurally, that is, by what their anticipation of situations allows their organization to accomplish. Thus, problems may intensify in a state of latency (i.e., outside awareness) until they escalate into crisis and destabilize an organization. As organizations collapse, crisis discloses the tragic consequence of unrealistic truth-procedures. Tragedy signifies a loss of effective meaning in which agents can't stop their implicit assumptions from downgrading to a domain of mistaken ideals and false beliefs (cf. Luhmann 1995: 252). At this point of tragic loss, organized agents face the challenge of inquiry: to build new domains and find new truths amidst the indeterminacy of crisis.

When an agent's beliefs lose the consistency of truth and her acts fail to satisfy ideal goals, she comes to rely on provisional interpretations of the indeterminate causal structure that underlies crisis. Moreover, as provisions entail plausible systems of inference, they must be updated and continually revised through inquiry (cf. Simon 1969, Rescher 2001). I contend that without inquiry, an organization would either be: 1) a monolithic institution of absolute truth that is unable to adapt to changing environmental constraints; or 2) a constant state of crisis or disorganization that is unable to stabilize effective operations within the environment. Inquiry provides a middle way that offers organizations a dynamic capacity to adapt to crisis without abandoning formal consistency (e.g., archival systems, grammars, legal discourse) and disintegrating into chaos (cf. Deleuze & Guattari 1994: 202 – 203).

I schematize the Walkerton Inquiry as a process of translation that draws the problematic crisis into possible solutions. Under the Public Inquiries Act of Ontario (1990) the Commission of Inquiry referentially fixes the indeterminate events that led to

Walkerton's crisis within a provisional causal order, and prescribes possible methods for preventing similar crises from occurring. Thus, alongside its evaluation of explanations and excuses for what 'most likely happened' at Walkerton, the Commission generates counterfactual situations, embedded within suggested procedures, that create an ideal scheme of what each organization should have undertaken to avoid Walkerton's crisis.

Inquiry translates past mistakes into future practices. The outcome of this translation effectuates an agent's judgement of present tasks and responsibilities. However, the rules of Public Inquiry in Ontario are such that the Commissioner's judgement cannot punish individual agents, or consolidate the provisional causal order of crisis within a scheme of *sine qua non* (e.g., 'but for agent X, Walkerton would not have occurred'). The judgement of inquiry is holistic and distributes a responsibility for mistakes across the organizations involved, so that each may adapt its formal system of truth to approximate the Commission's ideals. Thus, each organization caught by the Walkerton Crisis casts an ideal shadow within Public Inquiry. Judgement effectuates the approximation of real efforts and ideal goals along a virtual continuum where the past mistakes of an earlier organization inform the future emergence of an ideal alternate. An organization that emerges from inquiry is no longer what it was. After all, the formal system of truth that guided its information process no longer makes sense in the wake of crisis. However, ideals are not instantly realized through judgement. As objectives, ideals alter formal systems by introducing new goals for activity to achieve, but they also suffer mutation because emergent environmental encounters introduce potentially unforeseen problems. Thus, the dialectical process of inquiry is potentially open to infinite possibilities of organizational permutation.

Method:

There are three general modes of analysis subtending my project: 1) I conduct a descriptive analysis that models organizational cognition or how each organization involved in the Walkerton crisis coded and archived the situations its agents encountered, to form common referents of the environment (e.g. 'E. coli is...') and measures of effective agency (e.g., 'water inspection rates are declining').

2) I correlate my various descriptions of organizational cognition through a normative analysis that models how ideal goals and generally instituted assumptions fixed patterns of coordination between organizations: the Ministry of Environment, Walkerton's Public Utilities Commission, its Municipal Council, Public Health Unit, and residents. Agents interacting across these organizations did not overlook problems with Walkerton's water distribution system out of criminal intent. Until crisis forced the system's problems upon them (e.g., contamination), they coordinated with each other under the mutual expectation of normality and adequate conduct. Norms generally signify organizational coordinates or points where agents expect forms of activity to recur. However, in the case of Walkerton, normal expectations obstructed the formation of an adequate understanding of causes underlying the town's water distribution system. Normal operating procedures also discouraged agents from questioning the adequacy of their expectations because for 'all intents and purposes' Walkerton's organization was operating smoothly.

3) I synthesize descriptive and normative levels by a prescriptive analysis that examines how the organizations reconfigured possible courses of action and adapted

forms of agency in response to the crisis, especially after they became implicated as causes of degradation under the Walkerton Inquiry.

Objects of Analysis:

For this project I conduct a discourse analysis of Walkerton Inquiry transcripts (and related documents of policy and law) to produce a model of the water crisis that reflects the situated information process of disparate organizations caught in its wake (cf. Foucault 1969). The foundation of this sociological project is a series of descriptive models that represent the cognitive processes that subtend agents in various phases of coordinated activity. As the Walkerton Inquiry deals with multiple organizations, my descriptive models translate from an individual agent's cognitive style and rationale to general ontological domains that entail his or her position within a cultural lineage, organized set of norms, system of values, modal series of expectations (e.g., law) and game-theoretic strategies of information exchange.

Although a semiotician, I am not a proponent of linguistic reductionism in sociology. My analysis of the Walkerton crisis hinges upon the assumption that agents process information from actual physical encounters (e.g., with water and E. coli O157:H7). Exchanges and activities have real consequences, while the intentions of a human organism target the manipulation of real forces. Moreover, as physical encounters take place within the sensory range of each agent, they become formally recurring signs to be evaluated, categorized, archived, and potentially misunderstood. In the case of Walkerton, for example, Ministry of Environment officers and Public Utilities Commission operators reduced the complexity of E. coli to a low priority sign of 'decreasing water quality'. Not having placed the bacteria within a formal system of

inference that includes lethal strains like O157:H7, these agents could not recognize a threat of contamination whose formal recurrence had been ongoing since the late 1970s.

I contend that without some concept of formal recurrence or *semiosis*, sociologists cannot understand how organizations institute procedures to effectuate possibilities and actualize ideal goals, nor will they discover why agents fail to achieve certain goals and how they adapt countermeasures when confronted with failure.

Tools:

In this project I present a case study of a social situation in crisis and use that case as a model for systematizing a domain-specific ontology of adaptive organizations. My toolkit include conceptual developments in the human sciences that model how human organisms cope with metastable environments (cf. Simondon 1989 for an introduction). Specifically, I draw metaphors and modeling strategies from: 1) situation theory (cf. Barwise & Perry 1983, Badiou 1988, Cooper et al. 1990, Devlin & Rosenberg 1996); 2) dynamic semantics (cf. aspectuality: Parsons 1990, Verkuyl 1993, Higginbotham et al. 2000; plausibility: Shafer 1996, Pearl 2000; judgement: Tversky & Kahneman 1974); and 3) organism theory (cf. emergence: Goldstein 1934, Mead 1934, Dewey 1938, Ruyer 1952; organization: Foucault 1969, Simon 1969, Bateson 1972, Deleuze & Guattari 1987, Simondon 1989, Argyris 1992; evolutionary games: Axelrod 1984, Skyrms 1996, Binmore 1998).

1. Situation theory examines the interpenetration of agent and environment by schematizing their co-emergence within a unified domain of situations. A situation does not completely belong to an agent's faculties, nor is it simply a localization of the environment. It can be abstracted as a set containing the structures encountered within an agent's sensory range (e.g., what it can see, hear, smell, taste, touch) at any given time *T*. Structures are co-constituted by the agent's information process and what the environment offers. Consequently, a situation also contains operations available to the agent that are incumbent upon

the structural constraints culminating at *T*. Operations alter structures and structures inform operations. As such, they involve the same situational domain and mutually inform higher order schemes of technical competence, strategy and pedagogy. Operations are adaptive and not necessarily fixed by rigid grammars, as rules and laws emerge from environmental contacts and encounters with others (Deleuze 1994: 22 – 23). Neither are structures independent of operations because they are co-constituted by the way(s) an agent processes information within a sensory range. Situation theory develops a pragmatic model of direct reference (Recanati 1993) and explains how agents translate tacit codifications (e.g., structures/operations) into conceptual and reflexive schemes.

2. Dynamic semantics examines how pre-discursive ‘aspectual compositions’, such as events and situations, facilitate an adaptive agent’s information process within metastable environments (Verkuyl 1993). Metastability requires a system of plausible inference that allows agents to adapt. Plausibility entails an information process that is partial (because agents are not omniscient). However, an agent does not have to contain a complete simulacrum (or formal model) of its environment because it processes information directly within the sensory range that co-constitutes situations about the environment (Barwise 1989). An ongoing information process within an agent’s sensory range continually updates structural constraints in order to modify its current situation and the availability of possible operations.
3. Organism theory examines how social agency emerges from an organized biological process. My prototypical agent is a human organism that maintains an embodied (i.e., situated) neural network of structures and operations (Spitzer 1999). The body anchors social agency within a real environment *hic et nunc*. Through the body’s sensory range, a human organism encounters actual structures and coordinates with others by expecting possible situations. As the body, an organism experiences its own real power (*virtus*; Deleuze 1994) to engage, model and modify the structures and operations of actual beings (including itself).

I use these tools to extend current cognitive theories of social practice (cf. Lave 1988, Suchman 1989, Hutchins 1995, Engeström et al. 1996) into a model of Public Inquiry. My analysis schematizes the bidirectional system of ontological domains (cf. Jackendoff 1987 on language): that ‘bottom-up’ information processes update an agent’s understanding of situated encounters, while ‘top-down’ organizational systems connect the agent with ideal goals, possible conditions and forms of multi-agent coordination (cf. Ruyer 1952, Simondon 1989, Skyrms 1995). Inquiry emerges from the dialectical

contradiction this bidirectional system entails (cf. Clancey 1997). When an agent encounters a situation that is irreconcilable with her domain's goal-orientation (e.g., an ethical dilemma), she must conduct an inquiry through the contradiction or suffer from having to live in a world where ideals and reality fail to conceive satisfactory forms of activity (e.g., 'to get what you desire', 'to play by the rules').

With bidirectionality in mind, I propose a system of inquiry that tracks the organizing **procedures** and situated **emergence** of coordinated activity in a metastable environment. Procedures require ordered relations that determine a system of anticipated outcomes across bound phases of activity: e.g., before performing X_2 you have to accomplish X_1 . Emergence occurs between agonistic relations of disparate agents whose systems mutually inform a joint phase of activity where possible outcomes remain indeterminate: e.g., your co-worker jams the printer before you manage to print your overdue report. Agonistic relations entail overlapping domains and competing anticipatory systems (cf. Habraken 1998). In this context, domains organize the range of information available to an agent within a specific situation. Subtending domains are systems of formal recurrence (e.g., models informed by structures within a sensory range) that are partially indeterminate (e.g., requiring probability distributions), and possibly undetermined by an agent's activity (e.g., inaccessible ground water formations).

A basic organization involves domain-specific systems under the (at least partial) determination of an organism (Cosmides & Tooby 1994). The basic organizational entity of sociology entails a model of coevolution involving the parallel distribution of disparately situated, coordinating agents in various (potentially competing) phases of information process. The partial information process of each situated agent actualizes the

general domain of a multi-phase organization that summarizes, archives and conditions the anticipatory systems of each in turn (i.e., by enculturation). Thus, situated agents organize to share information, accomplish complex tasks, and monitor environments that require disparate perspectives and domains of activity: e.g., Walkerton's water distribution system requires PUC operators to maintain chlorination, lab technicians to assess water quality, and MOE officers to maintain adequate procedures. The sharing of information is emergent, and contingent upon the judgement of agents who coordinate agonistically under varying degrees of uncertainty. As a result, the process of organization evolves in the manner of a game (cf. Skyrms 1996 and Binmore 1998 on the evolution of social contracts).

Navigating the Project:

The project unfolds across eight chapters. Each chapter forms a partial inquiry into the Walkerton crisis, while offering specific strategies for interpreting and integrating the cognitive processes that subtend the perspectives involved. Strategies fall within descriptive, normative or prescriptive levels of analysis. To use a visual metaphor, each chapter is a kind of focal mechanism that zooms in on different levels of the organizational network containing Walkerton's water distribution system. Descriptive analyses zoom in on microscopic details of each organization's situated information process. Normative analyses zoom out to disclose macroscopic conceptualizations of coordinated activity across organizations (e.g., game theoretic metaphors of information exchange, and model theoretic analyses of legal form). Prescriptive analyses take readers to the outer reaches of the organizational network where nascent ideals, adaptive measures, and possible systems of activity emerge in conjunction with the process of

Public Inquiry. In *Appendix 1*, readers will find a table that summarizes each chapter's perspective on the network according to its levels of analysis (e.g., dominant scope), featured domains (e.g., dominant forms of activity and information process), featured organizations (e.g., dominant players), and thematic content (e.g., dominant concepts, metaphors, and schemes).

Apology:

The Walkerton crisis is a problematic situation. As such, there is not one definitive interpretation of 'what happened' to untangle the agents who've become caught in the situation's web of possible causes. To establish an adequate model of the complex problem underlying Walkerton's crisis, we will turn to the agents themselves: A) how they interpret the crisis to explain 'what happened', B) why they failed to register signs of the crisis before 'it happened', C) how they define the agency of others involved, and D) what forms of adaptation they take to overcome tragedy.

By turning to Walkerton's agents and analyzing the trail of statements and procedures they've disseminated in Public Inquiry and private policy, we will encounter subjects who are actively trying to make sense of Walkerton's crisis. They each conduct partial inquiries from perspectives that cannot be neatly reconciled, even under the legal formalism of Public Inquiry (e.g., chapter 5: the contest between two labs). All forms of inquiry emerge to address subjects whose perspectives have become confused: i.e., we find them in the process of under- or overestimating situations, making mistakes, and second-guessing expectations. As a result, readers who subscribe to deductive models of theoretical discourse (e.g., 'what are you trying to prove?') may feel overwhelmed by the multiple perspectives and shifting forms of agency explored in this project. I'd advise

them to take each chapter as part of a biographical enterprise that configures forms of agency, subjectivity, and rationality specific to the Walkerton crisis and its Public Inquiry. However, there is a theoretical continuum of generalities that guides our exploration of multiple perspectives. To map perspectives onto each other, we will use concepts that frame disparity within an organizational context of translation: agents belong to disparate domains (e.g., MOE versus PUC) and each mobilizes a deliberate style when reasoning about situations (e.g., MOE officer versus MOE manager, doctor versus patient); but they also form analogies between their situations, exchange information across domains, and attempt to coordinate activities despite differences in style.

Moreover, the Walkerton crisis begins when organizational processes of translation fail to coordinate agents around a common referent that satisfies the complexity of reality (e.g., *E. coli* 0157:H7). Thus, each chapter's partial model of the Walkerton crisis examines why situations and schemes may differ from reality and how organizations can invest in long-term goals that may inevitably lead to failure.

Readers who favour a linear sequence of variables when assessing the temporal order of causality (e.g., 'first X happened, which caused Y to happen, and that's how the crisis emerged') may feel overwhelmed by the cinematic montage of events that an exploration of multiple perspectives entails (cf. Deleuze 1986). Because our subjects are actively trying to place themselves and others within evolving schemes of 'what happened', we must not only trace where they position variables along a causal network, but how they go about editing sequences of positions. Agents don't stop operating when procedures fail. They travel through a web of past and future occurrences that informs

their activity in the present. To accomplish our biographical enterprise we must follow our subjects through a non-linear temporal order that subtends their archival formations and causal conjectures. Furthermore, this non-linear approach to causality subtends the information process of Public Inquiry (in Ontario).

To effectuate these modeling tasks, I apply metaphors and concepts within an interdisciplinary context. These applications are intended to disclose aspects of Walkerton's problematic situation, and are not to be taken as definitive statements about the particular disciplines ('schools of thought') that spawned them. I beg the reader's indulgence in crossing disciplinary bounds to produce a model of inquiry that satisfies my case. For combative readers who are eager to defend their discipline from 'omnivorous sociologists' (e.g., cognitive science, systems theory, evolutionary game theory), I recommend a less territorial approach to interpretation. An interdisciplinary context entails points of translation between disparate disciplines. Sociology offers a place for disciplines to exchange metaphors and modeling techniques, but only if they become interfaced through a social unit of analysis: i.e., the enculturated agent. For example, once concepts and metaphors from game theory or systems theory engage a model of social agency, they are no longer independent of an interdisciplinary context. They become theoretical hybrids that express collaborative relations between disparate disciplines (Deleuze & Guattari 1994). As such, hybridized versions of 'correlated equilibrium' and 'emergence' may appear unorthodox to specialists and disciplinary purists. My only advice to readers from these aforementioned groups is that they try to approach the hybridization of concepts as a process of metaphorization (cf. Schön 1963, Pask 1975). They should also keep in mind, that our basic unit of analysis is an agent

embroiled in Walkerton's water crisis. Ultimately, my use of concepts and metaphors is an attempt to disclose relations within the case. If they fail to facilitate the reader's interpretation of what happened at Walkerton, I offer this apology and encourage the reader to build models that satisfy his or her own information process, discipline, and cultural context.

Because inquiry begins when disciplinary confidence ('I know what I mean') turns to uncertainty ('now I'm not so sure'), models of inquiry must be open to the indeterminacy and confusion that emerging forms entail. To sample and document agents in the middle of a crisis, we must follow them through crisis.

Chapter 1: Crisis:

The Tragic Archetype of Politics, Towards Inquiry:

Consider the following situation: An Ontario town of approximately 5,036 residents suddenly encounters a general crisis that disrupts individual activities ‘across the board’:

“In May 2000, Walkerton’s drinking water system became contaminated with deadly bacteria, primarily *Escherichia coli* O157:H7. Seven people died, and more than 2,300 became ill. The community was devastated. The losses were enormous. There were widespread feelings of frustration, anger, and insecurity” (O’Connor 2002a: 2). Though the crisis was physically isolated, it rapidly escalated into a ‘public tragedy’ as reports of ‘Walkerton’s contaminated water’ and the ‘key actors involved’ overtook national news broadcasts, parliamentary debate, websites, and topics of discussion in communities across Canada. In a series of website diary entries commissioned by the Canadian Broadcasting Corporation (CBC), one of Walkerton’s residents James Skarnikat offers the following description (2000: May 26th entry):

The whole country knows about Walkerton by now. Everyone knows about the tragic deaths and the critically ill. As the situation became national news, our quiet community was transformed into a media circus. By Tuesday, May 23, it was as though an army had rolled into town with the big satellite-wielding trucks stationed throughout town. Everywhere, reporters questioned people, probing for answers and broadcasting. Media helicopters have circled over the town for days while medical helicopters have been rushing the critical to distant London. [...] Most people remain in shock. The massive media coverage on every TV and radio station has driven home the enormity of the situation.

The public spectacle emerging from ‘mass media coverage’ presupposes a tragic interpretation of the crisis. Tragedy discloses a core problem (*riddle*) within the mess of overlapping agencies caught by the crisis; thus, it converts agents into heroic *dramatis personae* who embody a portion of the riddle that spins fate along an interminable progression of acts. As Jean-Pierre Vernant writes on the concept of tragedy (1988: 242):

[Within] the space of the stage and the framework of tragic representation, the hero is no longer put forward as a model, as he used to be in epic and in lyric poetry. Now he has become a problem. Now, as the action unfolds and through the interplay of the dialogue what used to be praised as an ideal, the touchstone of excellence, is brought into question before the public. The hero becomes the subject of a debate and interrogation that, through his person, implicates the fifth-century spectator, the citizen of democratic Athens. From the point of view of tragedy, human beings and human action are seen, not as realities to be pinned down and defined in their essential qualities, in the manner of philosophers of the succeeding century, but as problems that defy resolution, riddles with double meanings that are never fully decoded.

Thus Walkerton's tragedy, the riddle of causes within the crisis ('2,300 ill'), ties a knot between each spectator and the local problem's general form ('is our water safe?'). Each knot imbricates part of the spectacle's network of opinion that informs a political debate between the spectators. Each spectator 1) gathers information about the problem ('watching TV'), 2) formulates a version of the riddle ('the problem is...') and 3) debates doxic variations (gossip, rumour, etc.) from a position in the network ('I read a report that said Koebel was innocent. Where'd you get your information?'). However, the problematic riddle presupposes interminable debate. There is no solution to the hero's fatal downfall; what each hero offers is simply a space of interrogation within the crisis, an archetype of politics.

The fatal flaw of the tragic hero (*hubris*) sets up a series of interrogations within the public gallery of spectators: 'Who acted irresponsibly?' 'Who shall pay retribution?' 'Who shall restore confidence?' 'Why did he do that?' Ultimately, tragedy is incapable of resolving the interrogative series; it lacks a general will empowered (by reason) to answer the riddle and sort through particular positions within the network of opinion. Tragedy alone cannot build or renew a polis. But, as Vernant (1988) claims, tragedy stages the problematic of politics while another form of publicity must complete the

solution. The riddle unfolds into political solutions by a dialectical engagement of *witnesses* that orders opinion along verifiable conditions of reason. Interrogation must become inquiry; the archetypical riddle's problematic indeterminacy must become a conditional truth-procedure that sets a goal beyond the crisis.

How can a complex of differentiated agencies set a common goal beyond crisis? Consider the following scheme. Responsibility for Walkerton's water distribution system diverges along a general organization of multiple agencies¹: Walkerton's Public Utilities Commission and municipality (PUC), the Public Health Unit, commercial labs, Ontario's Ministry of Environment (MOE), etc. Each agency conditions agents who exchange information and coordinate operations from specific goal-oriented domains of procedures; each goal specifies a portion of the agency's share in Walkerton's water distribution system and contributes to fixing the general organization's referential sentence: 'safe public drinking water'. The sentence is significant, transmissible and verifiable within a formal system or language of coordinating agencies; but it also specifies: 1) a truth-procedure or organizational goal amidst probable outcomes ('keep water potable or else...'); 2) protocols outlining positions for each agent (including the status of water as an identifiable entity); 3) contracts between agencies specifying duties and rights within a polis (right to clean water, duty to comply with Ontario's Water Resources Act); and 4) normal expectations shared by agencies and the public their organization envelopes ('we take it for granted that tap water is safe' because agents of

¹ *Generality entails organized agencies that coordinate games of information exchange according to mutually conditioned methods and schemes; and they effectuate coordination despite procedural disparity, such that agents belonging to disparate agencies register mutually oriented goals. Thus, certain schemes are generic across all agencies involved (same grammar, same map, same laws, etc.), certain conditions target forms of coordination (e.g., 'if a PUC Manager verifies contaminated water in the distribution system he or she must contact the MOE immediately'), and certain methods require more than one agency to actualize their goals, (e.g., controlling a town's water distribution system).*

the MOE and PUC expect their operations to effectively realize the *sentence*). The Walkerton crisis erupts within this organized field of containment, to test each agent's resolve and each agency's set of conditions.

The fact that Walkerton residents succumbed to illness (i.e., showed symptoms of contamination) signifies an organizational weakness; thus, the *sentence* agencies enforce is all or none ('either water is safe, or it's not'). Illness signifies that some combination of agencies (e.g., PUC and MOE) inadequately prepare agents for effectuating preventive measures (e.g., PUC operators chlorinate ineffectively; MOE officers fail to oversee PUC operations). However, the fact that another agency, the Public Health Unit in conjunction with area doctors who first treat the illness, identifies symptoms of contamination reaffirms the *sentence* and offers agents within the containment field an opportunity to effectuate repairs and redeem goals. In other words, once agents localize the crisis to a nameable² entity (E. coli O157:H7), they can match it with a profile of symptoms and begin effectuating countermeasures: e.g., flush the water distribution system, increase chlorination, prescribe medication, etc.

Once the Health Unit's Chief Medical Officer 'puts a name to the symptoms' he contacts agents from the MOE and may transmit a 'boil water advisory' to warn the public. As a result, the public is often the last to acquire confirmation of a breach in the organization's containment field. In general, once an agent within the containment field identifies a form of the crisis (signs, symptoms, indicators, etc.), it transmits a replication

² As Saul Kripke claims, names are 'rigid designators' across all possible worlds. Naming is one of the first countermeasures of any crisis because it 'fixes' forms of uncertainty and loose descriptions to a common referent (1972). Thus, even a possible world without E. coli requires a name that fixes the sense of its absence, etc.

of the form to all other agents playing its game³ of information exchange; thus, the organization may continue to adapt and conduct repairs even when half the town of Walkerton has already succumbed to illness. However, not all agents exchange information according to the expectations of other players; and even if exchanges meet expectations, their transmission of replications may be degraded, mistranslated, etc., by the time it reaches members of the public (e.g., rumour, panic).

Although the organization effectuates an adaptable information process, it cannot suppress the spectacle of crisis. The idea that an organized water distribution system failed because coordinating agents were inadequately conditioned is unacceptable to spectators and overwhelms outlying networks of opinion with uncertainty (a *riddle* forms). After tragedy, spectators continue to doubt even when general repairs are underway and the organization retransmits signs of effective sentencing: e.g., Ontario's Legislative Assembly introduces a 'Drinking Water Protection Regulation'; and the MOE declares stricter enforcement of PUC operations to 'keep Ontario's water the safest in Canada' (Newman 2000). Doubt is not so easily removed from the network of opinion because uncertainty has tainted the organization's general form: spectators understand that if Walkerton could slip into this unforeseeable tragedy then so could any other Ontario town managed by the same kind of agencies and conditions. Moreover, if Walkerton happened once, what could prevent it from happening again? For many spectators, the sentence 'clean water for Ontarians' rings hollow after the first sign of inconsistency. In its absolute form (as promise) the truth sentence is all or none; once

³ Games entail expectations that normalize exchange rates and differentiate an agent's position from every other (different agents are expected to do 'different things', depending on who they exchange with, what the stakes are, how long they've played the game, etc.). Not all agents are human (e.g., an instrument for measuring chlorine residuals was constructed to meet specific expectations).

broken, a promise may not regain a spectator's implicit confidence because even the reformulation of its goal (e.g., new legislation) signifies an inconsistency between *what was* ('clean Ontario water'), *what is* ('Walkerton water') and *what could be* (uncertainty). Thus 'clean Ontario water' has become a matter of opinion; and after Walkerton, MOE promises are merely plausible premises.

However, Ontario provides legislative measures that attempt to preserve law's eternal verity, despite intermittent revisions and crisis. The Interpretation Act of Ontario conditions the formations of law and declares (R.S.O. 1990, c. I-11, s. 18):

The amendment of an Act shall be deemed not to be or to involve a declaration that the law under the Act was or was considered by the Legislature to have been different from the law as it has become under the Act as so amended.

This statement does not present a realistic expectation on the part of spectators. Their network of opinion is not an entity apart from the disputatious circuit of denials and partial confirmations: i.e., opinion is a process and product of revision; it is provisional. The law, however, is above the forms (of power, patent, order, regulation, etc.) it confers, repeals, amends, consolidates and revises. To further mark this distinction, the Interpretation Act maintains that 'Law always speaks', even when engaging the rules of its formal construction; thus there is no meta-law to confer, repeal, amend, etc., beyond law's eternal presence (R.S.O. 1990, c. I-11, s. 4):

The law shall be considered as always speaking and, where a matter or thing is expressed in the present tense, it is to be applied to the circumstances as they arise, so that effect may be given to each Act and every part of it according to its true intent and meaning.

Conversely, opinion requires a temporal disjunction of incidents between 1) 'what was intended' and 2) 'what's happening now'. Thus, amid the possible concatenation of

incidents, tragedy strikes when the two orders become irreconcilable: e.g., Ontario Water Resources Act *versus* Walkerton's crisis.

Tragedy discloses a general collapse of order, a failure of conditions to effectuate usual goals, but does not necessarily represent particular forms of subjectivity that an agent's situation constrains *hic et nunc*. The contents of the crisis or physical constraints involved (E. coli, ground water, etc.) are secondary. Tragedy questions conduct, morality, method, and foresight, values that situations merely signify and constraints merely challenge. Thus, forms of tragedy substantiate the general failure of organizations without imparting responsibility to material causes (e.g., not: 'given its geological formations, Walkerton was inevitably bound for contamination'). Tragedy signifies that an agency's conditions were inadequate in meeting the challenge of an unfathomable reality ('whatever fate throws at you') that all physical constraints express.

When crisis takes on a tragic form, it unifies disjunctive series of situated constraints and problematic conditions within a riddle 'too densely woven' for any particular agent to bear. However the riddle requires actors whose gestures transport each spectator from one problem to another. Thus the burden of tragedy falls upon general forms (or *figures*) of subjectivity who impersonate an aspect of organizational degradation⁴: the 'scapegoat', the 'town drunk', the 'good intentioned idiot', the

⁴ Themes of the scapegoat arise throughout the Walkerton Inquiry, though under the rules of inquiry (especially Commissioner O'Connor's 'personal mandate') they are rarely taken for probable schemes of causality. Walkerton's first Public Utilities Commission (PUC) Manager (of operations) was a 'notorious drunkard' whose hostile approach to PUC Commissioners contributed to the lack of information exchange between the two agencies, at least according to witnesses from Walkerton. The Ministry of Environment in its own defence attempts to portray Stan Koebel (PUC Manager during the crisis) as a negligent figure who not only failed to operate under MOE conditions but never bothered to learn them. In his defence Koebel's lawyer presents his client as a 'simple, good natured' figure who 'loved his town' but lacked the technical capacity required to maintain a PUC. Thus figurations emerge when witnesses attempt to explain or excuse their actions; but these rhetorical devices cannot fully schematize causal networks because they remain unsituated orders of reason, i.e., how different witnesses ideally characterize each other and generalize their activity.

'manager who cut corners', the 'deputy minister who didn't know better', etc. Each of these figures cannot possibly answer the riddle, nor would a scheme correlating each one of them completely solve local problems of agential coordination. The figures belong to tragedy and are minor premises within the riddle whose major premise remains absent (i.e., the unfinished space of interrogation).

Thus the foundation of politics requires tragic figures that guide spectators and stabilize the network of opinions. But figures are not simple scapegoats; they are the persona of agencies and express univocal conditions (despite multiple agents) that permit an agency to engage public spectators in the guise of a self-consistent entity. For example, the minister, the contaminant, the sick child are figures that express a variable of agency within the general organization of Walkerton's water distribution system. The sick child signifies a future citizen, the minister signifies a unified ministry and the contaminant signifies an external threat to 'watch out for'.

Each figure relies on a normal distribution of expectations and interpretations. For example, given the games of information exchange currently in play during the Walkerton crisis, agents, spectators and town residents believe the 'sick child' is a token of 1) the degraded water distribution system, 2) procedural inefficiency, and 3) negligence. Thus a figure can be modeled as a correlation coefficient of 1) certain shared expectations ('we thought the water was safe'), 2) situated traits ('this pale dehydrated child has diarrhoea'), 3) affective concerns ('public outrage', fear) and 4) the effectuation of organizational goals ('my sick child proves the system has failed'). Each of these four figurations that effectuate the figure entails a scheme of reasoning, or cluster of concepts that relate groups of disparately situated agents, spectators, reporters, residents, ministers,

etc. Figurations are rhetorical: tropes (e.g., safety and water), metaphors (e.g., a sick child is a 'sick' organization), analogies (e.g., a PUC operator treating a town's contaminated water system resembles a doctor treating contaminated residents), general proofs, canonical examples, and methods of interpretation.

As bodies of reason, figures appear to convince an audience and sway their judgement towards a common scheme or resolution. But figuration entails situated agents who dispense rhetorical procedures: disputants, orators, eulogists, advocates, counsel, lawyers, 'communications officers', publicists, reporters, etc. Thus, a figure must contend with competing reasons whose figurations may draw on more powerful affects. For example, immediately after the Walkerton crisis seizes public attention the Mayor, municipal council and PUC commissioners attempt to coordinate a common front, because each agency would have to answer to news reporters, Ontario Provincial Police, angry residents, concerned citizens, etc. However, Dr. Murray McQuigge, Chief Medical Officer of the local Health Unit who is also present at their meeting accuses the PUC Manager (Stan Koebel) of misconduct and threatens to take his concerns to the mass media (W1A00/11/29: 209 – 216). Thus, McQuigge effectively aborts the Walkerton agencies' attempted figuration: the emergent figure of 'calm procedural control' cannot collectively impersonate coordinating agencies if one of them contradicts the group and decides to 'point fingers'.

Long after a tragedy is forgotten, figures continue to haunt our investigations. A figure is conceptual by nature; it does not belong to any particular situation and does not code any particular aspect⁵ (e.g., a colour, a scent, a feeling or operation). A figure is

⁵ *Aspectuality ballasts our understanding of situations: despite the particular qualities they gather, aspects index situated tokens as either terminative or durative types of sense (Verkuyl 1993). Terminative indicates*

conditional: instead of expressing situated constraints from a particular environment, it codes over series of aspects (e.g., diarrhoea + water + chlorination...) and correlates them with specific affects (e.g., fear, anger, thirst) such that they form the major premise of a syllogism. The minor premises establish conditions for proceeding towards⁶ (i.e., inferring) the major premise: each minor premise is an interpretation of situations, an evaluation of what happens in a particular game 'in the world'. A figure thus represents a scheme for tracking and registering series of aspects within the game. For example, here are six minor premises that an observer would consider: 1) 'townsfolk got diarrhoea'; 2) they all use tap water; 3) a doctor identified E. coli O157:H7 from their stool samples; 4) the Public Health Unit broadcast a 'boil water advisory' on the radio; 5) the PUC has been flushing water through the system, noticeably more than usual (e.g., fire hydrants are spilling out onto the street); 6) tap water smells like chlorine, more than usual). Through these six different minor premises the interpreter faces a figure: 'The water is contaminated'. Moreover the figure designates a modal distribution of ontological proportions: the water is not 'possibly contaminated' because the modality of contamination has become a necessary predicate of water, quantified over all possible situations where Walkerton is included. As a result, residents feel justified in concluding, 'we'll never treat water the same way again' because its formal consistency has changed. Thus, they also stake claims around this sentence, in disputes over Walkerton's crisis: regarding compensation, retribution, condemnation, etc. Of course, not all subjects are

a complete event or 'specified quantity'; durative indicates an ongoing event or process beyond the observer's situation.

⁶ *In actuality, the syllogism operates backwards, by abduction: the figure begins with scattered tokens, then takes us back a stage (to a time where the tokens configure along a causal network, where they exchange information as variables, etc.): once the major premise forms from the previous 'bits of situations', the interpreter recognizes a causal connection between the collection of tokens that nevertheless belong to disparate situations.*

justified in belonging to the sentence or may belong to it for different reasons. For example, the mayor who uses a private well and the MOE officers who live outside Walkerton are seized by the crisis but ‘don’t have to boil their own water’. In other words, a subject who enunciates the sentence may be called upon to substantiate his or her claim.

Thus there are two subjects of discourse: an enunciator or transmitter, and the subject of enunciation. If a transmitter fails to substantiate its claims (e.g., radio: ‘boil water advisory in effect... *this is an emergency broadcast*’) then its sentence may not be effectively realized: ‘residents believe it’s a joke’. Enunciators, like the radio, often embed a form of authorization in their statement: ‘this is an emergency broadcast, by order of the Chief Medical Officer of Health...’. Thus, an enunciator who *manifests* a subject of the sentence may be called upon to testify as a witness. The witness substantiates one of the minor premises (‘my child has gastroenteritis’) so spectators or judges may conclude the major and complete the figure: ‘we’ll never treat water the same way again, now that it’s contaminated’. Moreover, the substantiation of transmissions is incumbent upon a range of transmission: the Public Health Unit broadcasted its ‘boil water advisory’ over local AM and FM radio stations but not on television or in newspapers (O’Connor 2002b: 23; W1A01/01/18). Some Walkerton residents are not aware of the advisory when it airs on May 21st. As resident Diana Adams testifies before the Commission of Inquiry, her reaction to the advisory was less than favourable because of how it was transmitted:

Q: And how did you feel when you heard about the – that the boil water advisory had, in fact, been issued on the Sunday and it was Tuesday morning? **A:** I was appalled, I – I just – I couldn’t believe that anything that important had been left to a local radio newscast and – I was – I was

also frightened because I knew, you know, my two children were already sick and I was worried about them (W1A01/01/16: 12).

If not for her place in Walkerton's network of opinion, Adams would not have questioned the town's water (according to her earlier diagnosis: 'my two youngest children were sick with the flu'; W1A01/01/16: 12). Moreover, discovering the advisory 'second hand' undermines the Health Unit's intended effect, to maintain a sense of authority and prescience over the crisis.

Nevertheless, a figure is an ideal replication of actual events: in terms of 'what an agent expects will happen'. Thus, figurations rely on coordinated expectations across disparate agencies. An expectation consists of tokens across situations that signify formal recurrences and remind the agent of probable aspects, such as 'tap water shouldn't cause diarrhoea', 'eating uncooked hamburger meat should', etc. As certain expectations become increasingly uncertain, minor premises emerge from critical points that have become problematic in the game of coordination, e.g., an agent's minimum expectation of potable tap water has dropped below the point where she or he is willing to 'have a glass of water from the tap'. Thus, the agent has taken a necessary position on the status of water. This position *dominates* the agent's decisions in games of coordination involving 'tap water' (Lewis 1969), while before the problem, a Walkerton resident hardly thought of 'tap water' as a point of decision within a game of coordination.

Chapter 2: The Players:

The Political Prototype of Inquiry:

The number of agents involved in the Walkerton crisis is too great to keep a consistent or credible dramaturgical analysis. Even the 'public chorus' of Walkerton residents fragments into pockets of interest, with their own specific claims and forms of legal representation: e.g., 'Concerned Walkerton Citizens', 'Walkerton Community Foundation', 'Sierra Legal Defence Fund'. Even Walkerton's municipal councilors, PUC operators and Public Health Unit internally fragment into particular interests, each with its own specific forms of representation (counsel, etc.), jurisdictional claims and concerns: e.g., each PUC operator has his own lawyer, most members of town council have their own lawyers and Dr. McQuigge has a team of lawyers.

Moreover, if the Walkerton crisis is an organizational tragedy, does *Escherichia coli* O157:H7 become an agent of *Nemesis*? If so, whose *hubris* shall the public, despite its fractious consistency, condemn? There are at least five candidate agencies whose agents' expected duties become problematic during the crisis: 1) Walkerton's Public Utilities Commission, its operators, and manager; 2) Walkerton's municipality, the Mayor and council members; 3) the Public Health Unit and its Chief Medical Officer; 4) the Ontario government, especially the Ministry of Environment, its Operations and Planning Divisions, but also the Premiere and Management Board of Council, who manage inter-ministerial resources; 5) Commercial laboratories that analyze water samples for contaminants on behalf of municipal PUCs. Each of the five candidates holds positions in games of coordination, that express specific forms of legislated expectation in Ontario. Altogether, these positions express a portion of the public's contractual right as citizens of Ontario to 'water free of contaminants'. The following

bullets summarize the key forms of legislation exposed by the Walkerton tragedy and how each form conditions the positions of our five candidate agencies. Each form of Ontario legislation embeds public expectations along a scheme of situations:

- The Ontario Water Resources Act expects Walkerton's Public Utilities Commission to manage the town's ground water distribution system under a regime of approvals for water taking, water wells, water supply, treatment facilities and sewage works. A branch within the Ministry of Environment's Operations Division dispenses approvals; thus the expectation of standard operations affects both agencies, i.e., the Act expects a PUC to apply for approvals and expects the MOE to dispense them accordingly.
- The Public Utilities Act expects a municipal council (of elected officials) to pass a bylaw that establishes the PUC and entrusts it to control and manage the waterworks (section 38(1)). Amendments to the Act in 1996 allow municipal councilors to repeal the bylaw (without plebiscite) and dissolve the PUC, if they believe its operations ineffectively maintain the waterworks and inadequately protect the public from contaminants, etc.
- The Health Promotion and Protection Act expects a Medical Officer of Health to "inspect or cause the inspection of the health unit served by him or her for the purposes of preventing, eliminating and decreasing the effects of health hazards in the health unit" (s.10). When the Medical Officer of Health receives a complaint related to environmental or occupational health, e.g., contaminated drinking water, he or she must notify the Ontario ministry primarily responsible, e.g., the MOE. Whether or not the officer can substantiate the complaint, he or she must investigate it in conjunction with the specific ministry.
- The Environmental Bill of Rights (1993) currently expects thirteen Ontario ministries (2001), e.g., the MOE, to formulate (through public participation) sentences stating 'environmental values' that specify how each ministry intends to preserve a common environmental referent, e.g., water; especially when ministry agents must decide upon courses of action that may alter the referent's consistency. The EBR enacts a process of public participation whereby Ontarians 'have a right to': '1) comment on environmentally significant proposals, 2) ask a ministry to review a law or policy, 3) ask a ministry to investigate alleged harm to the environment, 4) appeal certain ministry decisions, and 5) take court action to prevent environmental harm' (Miller 2001: 16). An Environmental Commissioner of Ontario effectuates the EBR, and is an independent officer of the Legislative Assembly (appointed for a five year term). The ECO mediates between the public and ministries falling under the EBR, and drafts an annual report reviewing each ministry's observance of 'environmental values' and treatment of public

concerns (under the five basic rights). For example, about a month after the Walkerton crisis broke, a public coalition consisting of the Canadian Environmental Law Association, Toronto Environmental Alliance, and Dr. Adam Winterton filed an Application for Review under the EBR requesting a formal MOE review of the safe drinking water legislation (Lindgren 2000). In late August 2000, the MOE granted the EBR Request for Review but refused to grant public input during the review process. The MOE is not legally bound by the ECO's requests or recommendations. However, if the ECO perceives a 'lack of cooperation' he or she may note such concerns in the annual review, etc. Thus the EBR conditions ministries under the threat of 'bad publicity' since ECO staff distribute the annual review free of charge to various public institutions and community groups.

- The MOE generates a set of guidelines that specify 'best practices' for maintaining common referents, in line with Ontario's environmental values. Guidelines take the form of bulletins, objectives, alerts, data sheets, etc., that add prescriptive detail (e.g., 'how to properly chlorinate a ground water distribution system') to normative conditions (e.g., Public Utilities Act). Prescriptions are not necessarily binding. For example, when the MOE stopped offering laboratory analyses of water samples, its agents encouraged commercial labs to fill the gap; as a result, the MOE altered Ontario's Drinking Water Objectives to include the responsibilities of commercial labs. However, the statement of values does not necessarily stipulate penalties if agents transgress values. Thus, prior to the Walkerton crisis, Ontario's Drinking Water Objectives expected commercial labs to notify the MOE of contaminated water samples, without legally obligating them to do so.
- The Waterworks and Sewage Works Regulation 435/93 expects the owner of a waterworks facility (i.e., a municipality or PUC) and the operator in charge (i.e., the PUC Manager) to comply with specific operating standards. The manager must hold a license applicable to the complexity of the facility; and every operator under his or her direction must either hold an applicable license, or be an operator in training. All operators and maintenance personnel must have access to operations and maintenance manuals, 'sufficient for the safe and efficient operation of the facility' (s.16). Every operator must also have at least 40 hours of training per year (s.17).
- Under the Ministry of Environment Act in conjunction with the Ontario Water Resources Act (OWRA) the MOE has supervisory authority over all surface and ground water in Ontario. The OWRA prohibits the discharge of any material into water that may cause personal injury, and expects any person who discharges pollutants to notify the MOE immediately. Under these expectations the Minister designates employees as Provincial Offences Officers and appoints Directors who enforce the Act (s. 5(1)–(3)). Directors and provincial officers may require agencies to comply with specific operating conditions in order to protect Ontario's public water supply. Certificates of

Approval (granted by the Environmental Assessment and Approvals Branch of MOE's Operations Division⁷) are required whenever a PUC or operator in charge wants to establish, alter, extend or replace a portion of the waterworks. The granting of certificates ultimately rests upon a Director's decision. Prior to issuing an approval, the Director (or his or her officers) may cause the PUC to submit plans, explain methods, commission engineer reports, or simulate possible effects on the water system (through a controlled experiment). A Director has the power to order agencies that fail to obtain approval before establishing a waterworks to comply with MOE conditions at their own expense. Moreover, the OWRA expects a Director's order to represent public interest (s. 52(4)). A Director may revoke or alter the conditions of an approval after granting it. For their part, provincial officers may enter and inspect a waterworks (without the owner's permission) to evaluate the quality of water and determine the causes of any impairment of quality. In this position officers may examine and remove equipment, documents, etc. belonging to the waterworks (s. 15). They may also issue 'field orders' that require an agency or specific agents who have contravened the OWRA, a regulation or term of an operator's license, to undertake procedures that will achieve compliance. Officers may also order contraveners to provide an alternative source of water should the need arise (s. 16).

Each of these legislated expectations: 1) formalizes operations within the general organization, 2) maintains positions within games of coordination between organized agents, 3) standardizes forms of information exchange across disparate agencies, and 4) conditions agencies towards common organizational goals. Agents must produce certain tokens to verify their position within the organization. For example, once a PUC Manager convinces his liaison at the Approvals Branch, he gains a Certificate of Approval that affords him a certain currency for altering situations by reconstructing the waterworks: e.g., digging a new well, whose water will be 'softer' for consumers. On the other hand, agents who fail to comply with expectations or fail to produce verifiable tokens risk incurring penalties (i.e., 'if they're caught').

⁷ Operations Division manages Approvals Branch, as well as the various regional districts of provincial officers. Other divisions, like Corporate Management, Environmental Sciences and Standards, Planning, etc., manage the MOE's internal organization (e.g., human resources) and/or formulate general goals to be achieved by Operations, etc.

The laws that condition powers and penalties for each agency belonging to an organization are consonant with the positions its agents afford in games of coordination. However, a spectator 'looking down from the gallery' does not necessarily know 'the rules of the game'. Thus, figurations of tragedy do not represent laws as eternal essences. As Vernant (1988) claims, tragedy problematizes essence. Laws can be repealed and altered, or fall into disuse; they do not guarantee a perfect game of coordination (despite beliefs that a truth sentence is 'all or none'). Thus, the hubris of a PUC Manager who refuses to acquire a Certificate of Approval has more in common with a game this PUC Manager plays with provincial officers than with the 'penalty of transgressing categorical imperatives'. From a pragmatic perspective: a law is only a law⁸ if someone or something catches an agent 'in the act', i.e., if it can be enforced. If a PUC Manager gets away with not having filed for approval, nothing out of the ordinary may arise (unless of course, one believes in a transcendent judge who surveys all positions within the game). However, the manager's flagrant act may bring the entire organization down, i.e., if the unapproved portion of his waterworks exposes the system to contaminants, etc.

Thus, figurations of law are always specific to a probable distribution of outcomes within a local game of coordination; they represent strategies for mobilizing groups of agents and securing sentences that may become ineffective if agents decide to risk penalties and 'play by different rules'. Expectations are not 'pulled out of thin air'; they arise from prolonged games of coordination and cycles of information exchange (i.e., tradition, pedagogy, economy), whereby agents observe formal recurrences (stages, aspects, etc.) and equilibria (exchange rates, outcomes, etc.). A formal recurrence is a

⁸ *This pragmatic rule of application may even cover physical laws, except that gravity catches 'an Earthbound' agent more often than not.*

typical event, whereby some token repeats itself across discrete occurrences within an agent's sensory range (i.e., what she observes). The token often follows a sequence of occurrences that altogether signify a typical event or process. Filing for a Certificate of Approval is a type of activity. There are stages to the ritual: 1) an agent (the PUC Manager) fills out a standard form detailing how and why he wants to alter the waterworks; 2) the liaison from Approvals branch surveys the completed document and may request further explanations for the project; 3) after the liaison gathers adequate information from the manager, she or he may stipulate conditions, should the project be undertaken. 4) If a manager's project falls within a certain category of alterations (e.g., by altering the chlorination process), an abatement officer who monitors local PUC operations will have an opportunity to append a statement of comment to the project document (as a witness of actual contraventions). Comment specifies conditions and reasons (e.g., extracts from the legislation) that an authorized witness of PUC operations prescribes; it may halt the project (depending on the officer's level of authorization and influence within the game of coordination, etc.) Regardless of who the PUC Manager is, what the project is, and where the game of coordination is taking place, if the PUC requires a Certificate of Approval, these four stages are its form; each stage is a token (or subtype) of the 'filing for...' activity. However, variations ensue: some projects entail fewer conditions than others, some PUC Managers are *familiar* with their provincial officer, while others 'don't know what a provincial officer does', etc. Variables within the four stages correlate to determine one of three possible outcomes: 1) no approval, 2) approval with condition, 3) approval without condition. Depending on how each agent coordinates within the four stages of the game, one of the three possible outcomes

increases in probability (i.e., as a correlation coefficient of variables within each stage, etc.). Thus, equilibria are points of stability within a game of coordination that agents appropriate to optimize probable outcomes. The PUC Manager recognizes variables within a particular stage of the game that elicit cooperation on the part of an Approvals liaison, e.g., 'I show him X' where X = consumer testimonials requesting the project, etc. Thus, strategies emerge to facilitate the formation of equilibria, e.g., 'Tit for Tat': 1) cooperate on the first encounter, and 2) in subsequent rounds, do whatever your opponent did on the previous round (Axelrod 1984; Casti 1996: 37; Skyrms 1996). 'Tit for Tat' is the essence of compliance, the correlated equilibrium between a conditioning agent (e.g., MOE officer) and the interpreting agent (e.g., PUC Manager). Compliance is the MOE's goal, thus ministry agents coordinate enforcement strategies around the expectation of this equilibrium (e.g., that a homology, agreement, protocol, common referent, etc., is possible between an officer and the PUC Manager). Thus, a PUC Manager who expects 'MOE officers will expect compliance' plays accordingly, to maximize his or her minimum payoff, i.e., 'the MOE officer goes away, if I show compliance'. Thus, if a liaison from Approvals branch requests the 'standard proposal form', a PUC Manager will more likely generate an outcome of approval than disapproval (at least until the next stage of play). Of course, some agents never quite understand the official rules to begin with, nor do they conform to expected equilibria; but their intent may be to manage the waterworks as best they can, according to their own sense of justice (e.g., concern for the public, etc.). Thus, tragedy interferes with attempts at framing the crisis under a universal procession of laws or universal set of equilibria.

Nemesis does not distribute universal justice; *she* appears after specific decisions of coordination fail, and never in the form of essential qualities (e.g., the ‘bad PUC operator’). Tragedy, like justice, is blind and will take everyone down if the conditions are right. But, in the case of tragedy, conditions are right when organized agents fail to meet the challenge of reality. Thus, in ‘Walkerton’s tragic circumstances’, *E. coli* as *Nemesis* represents the organization’s inability to contain a portion of reality (e.g., within the sentence of formal law, within correlated equilibria, etc).

When a crisis occurs, it challenges an agency’s concept of control, e.g., the water distribution system’s ‘field of containment’. For human information processors, control is not simply the natural effect of a system. Control entails varying degrees of decontrol: a system under control consists of threshold variables that signify organizational instabilities when their values converge toward specific critical points. The critical point entails a probable distribution of possible worlds, such as, ‘where do we likely have control? Where are we likely losing control?’ Possibility entails an order of reasons. When we consider possibility, we want to know how a certain threshold variable correlates with others: ‘how does one possible world causally connect to another in the series of possible causally connected worlds?’

Thus, to determine the causal connections that stabilize a system under control, agents must include themselves as observers who schematize a causal network of the system according to specific methods of interpretation (distributing tokens, conceptualizing control, setting threshold values, etc.). The inclusion of an interpretive agent determines points of decision between counterfactual situations within the system of control, e.g., ‘if we adjust the chlorinator we will probably neutralize contaminants’

but ‘if we increase chlorination the residents will probably complain about the taste of tap water, therefore...’. Counterfactual situations consist of expectations coded about ‘the task at hand’; an agent considers possible worlds from a point of decision that interrupts the continuity of current procedures: ‘Now what should we do?’ Thus, control (at least when modeled by a human information processor) inevitably leads to games of coordination, whereby equilibria (or systematic process cycles, etc.) signify embedded decisions between counterfactual situations (‘now what?’) across possible worlds. How does a molecule of water maintain consistency? In this case the metaphor of a ‘decisive observer’ breaks down, as control becomes a matter of interlocking physical constraints apart from ‘possible conditions’. But even physical constraints can be modeled as correlated threshold variables: e.g., ‘how much force does it take to decompose a water molecule?’ We just don’t expect a water molecule to expect ‘possible worlds of decomposition’.

The Emergence of deliberate Inquiry:

Tragic reasoning does not contain the process of deliberate inquiry. Tragedy’s fatalistic logic is anti-dialectical: no matter what arguments or counterexamples are thrown against the tragic figure, its course is unwavering from one minor premise to another, like a programme with only one necessary conclusion. Tragedy establishes a fatal impulse, internal to each figure that impels the inevitable conclusion of disorganization. An agent characterized by this rhetorical scheme signifies a threshold variable (internal to some organization) that exceeds the limit (*hubris*) in which that organization maintains stability. Once emergent, the tragic figure is a ‘seal of doom’; once caught in this rhetorical scheme, the hubristic agent’s particular information process, his or her

understanding and judgement become inconsequential: e.g., ‘he was bound to slip up one of these days’. Thus tragic figurations obscure the order of reasons that underlies an agent’s point of decision, i.e., the conditions internal to the agent’s own information process (interpretive criteria) that may have contributed to the crisis.

Deliberate inquiry combines disparate figurations of reason; it unfolds a web of causal conjecture, wherein multiple disputants each occupy a problematic position. A position signifies a decision point that branches over a particular disputant’s stock of counterfactual situations. From his or her position, the disputant transmits witness statements, figurations, opinions, etc., that correlate with other transmissions from positions throughout the web. Correlated transmissions effectuate judgement; thus disputants take sides, support each other’s proofs, contradict statements and interrogate witnesses, etc., in order to substantiate their claim of Reality (or share in the dispute).

Thus, Walkerton Inquiry Commissioner Justice Dennis R. O’Connor eschews tragic figurations of causal conjecture. Though Stan Koebel, Walkerton’s PUC Manager, explicitly attests to falsifying information sent to MOE inspectors about the PUC’s sampling regime, O’Connor concludes that Koebel’s reasoning is more complex than the figurations of ‘villainy’ (2002b: 24). But the exclusion of tragedy is also a condition of Ontario’s Public Inquiries Act (1990 c. P-41, s. 6(2)). Anyone the Commission accuses of misconduct must be notified prior to the accusation and allotted time within the inquiry to conduct a defence, question witnesses, and appeal claims in Divisional Court should the need arise. Thus, witnesses cannot use fatalism to conceptualize their explanations: e.g., the MOE holds Koebel solely responsible for the crisis, but Commissioner O’Connor (2002a: 290) considers this an unjustifiable and unconvincing rhetorical tactic.

Chapter 3: Inquiry as Dialectical Process:

Encounter:

Inquiry marks the passage of human being, an eccentric path from one problem to another that leaves a trail of encounters between *who we think we are* and *what we think we sense*. *Who we think we are* entails a subjectivity that proves by auto-justification (Ruyer 1952's 'cogito axiologique'). The position of a subject hinges upon truth-procedures that verify its conditional propriety across situations; thus, the situated expressions of subjectivity (statements, operations, etc.) that disclose 'who we think we are in a given situation' become authenticated within a general order of reasons (i.e., axiomatic propositions, models, goals, etc.). *What we think we sense* entails facing others, identifying a concern, interpreting signs of passage, discerning familiarity, calculating uncertainty, but also involves misunderstanding and becoming effectively overwhelmed by sublime events.

The essence of inquiry is *dialectics*: within an agent's sensory range there are disparate entities, capable of combination and recombination, integration and differentiation, intercession and emergence. The first consistent form of inquiry is dialogue. Dialogical relations invoke metaphors of doubling: observer/appearance (Arendt 1971); self/other (Hegel 1977); internal/external (Bakhtin 1981: 135); force/place (Badiou 1982); organism/environment (Mead 1934, Dewey 1938, Ruyer 1952); virtual/actual (Deleuze 1994); physics/metaphysics (Aristotle 1984); subject/object (Kant 1990) and so forth.

Dialogical relations emerge between self-organizing systems (Mainzer 1996) that are external to each other and effectuate an information exchange that alters the consistency of subsystems each contains, manages or repairs. Information exchange entails a point of symmetry between disparate systems (otherwise there could be no

relation of cause and effect or call and response). Thus, doubling signifies a disjunctive synthesis: the two systems are of different orders and yet are common enough that one alters its activity in response to signals of what the other 'is doing'. For example, here is a case between physics and metaphysics: 1) An observing engineer references a general formula that discloses the rate of chlorination in a particular ground water distribution system; he wants to measure how effectively chlorine diffuses throughout the water distribution system in order to determine whether or not the current form of chlorination complies with minimum standards, i.e., MOE's Chlorination Bulletin (1987: 9) requires a diffusion rate of 0.5 mg/L of water after 15 minutes of contact time 'before reaching the first consumer'. 2) The observer informs the formula from a path the 'distribution of water and chlorine' forces through his sensory range; the path (or sampled distribution) entails a complex human sense involving a mechanical sensor that registers 'signatures' of chlorine per units of water. 3) From a sample, the formula generalizes how sensory events (i.e., chemical reactions) formally recur within a controlled experimental situation (e.g., constant chlorine injection *versus* intermittent bursts); generalization entails standard units of measurement, universal constants, and generic variables that structure all possible rates of diffusion: temperature, pressure, volume, etc. Thus, the formula orders variables within a physical system that frames or contextualizes observation (e.g., physics, chemistry, biology, etc): in chemistry, for example, diffusion rates increase with temperature and decrease with increasing pressure, molecular weight and molecular size. Although molecules of chlorine and water interact differently than water and sucrose, for example, they are variations within the same physical system of variables, which preserves their values across multiple situations of reference, such as the periodic table of

elements or statistical thermodynamics. The same formula can be used to measure the diffusion of sucrose in water, provided an observer has adequate sensors to sample and register the distribution of sucrose particles per units of water. Thus, it reproduces a general form of 'X diffusing through Y' across particular situations by averaging out the statistical distribution of events sampled by each sensor (i.e., standard deviation, beyond which results are errors).

Samples are bounded identities or measures coupled with occurrences: at Time t , X occurs, where X is a measure and t is a generic variable that registers occurrences by an order of sequential incidence. There is no actual variable for the occurrence, only a generic incident involving the occurrence and its measurement and what the measurement signifies (for an interpretive agent). Even when the occurrence is a contact point between bacteria (e.g., *E. coli* O157:H7 or *Cryptosporidium*) and Walkerton's ground water distribution system, the actual occurrence is recorded elsewhere as an event. Events are sensational, affective, uncertain, threatening, serious, plausible, typical, boring, 'not what they used to be', predictable, historical, interesting, destined, significant, etc; as such, they capture each agent's ongoing response to an occurrence (e.g., symptoms) and are not adequately isolated within a single frame of measurement (psychological formulae are often inconsistent across groups of affected agents; Rachevsky 1959, 1968).

The formula's general form becomes a metaphysical problem once an observer questions its consistency: e.g., is the rate of diffusion an aspect of chlorination, an aspect of water, an aspect of geological formations surrounding the reaction, an aspect of the observer's sensory range ('we've been reading it upside down!'), or an aspect of the

observer's method of registering events ('chemists don't sample rock formations')?

Though the question of consistency straddles an incidental series of variables ('what we're trying to measure'), the answer resolves the series by two disparate systems. An observer surveys both systems and is their point of intercession (judgement): 1) this agent is a node along the (causal) path of a physical system; his body stands in relation to bodies of water, chlorine, light (allowing him to read the mechanical sensor's output), electricity (powering the mechanical sensor) and rock (supporting the copper pipes that conduct the ground water distribution system); and 2) he registers exchanges with other nodes as events within his sensory range. Events engage types of formal recurrence that he observes through the situations of his body: once he connects typical events with situations, he generates methods for re-experiencing situations and preventing events by schematizing a causal network connecting paths through situations and the probable occurrence of events.

Methods repeat situations because they train an observer's physical activity (e.g., 'Look this way; now do you see it?'). Observation requires an order of reasons: e.g., an engineer who 'looks after' chlorine diffusion operates under the condition that chlorination 'is approximately 0.5 mg/L of water' and 'keeps the water clean'. Thus, the second or metaphysical order doubles the first; it expresses the observer's capacity for ordering his sensory range by evaluating actual points of contact within the physical system along virtual registers of affectivity, significance, conditionality, morality, strategy and *virtù* (Machiavelli 1961; Althusser 1999: 56 – 57): e.g., PUC operators are obligated to serve the public 'potable water' or 'they could lose their jobs'. The first or physical order does not necessarily require a second: e.g., chlorine is a natural compound

of physical elements, not a mere feeling or artificial synthesis of observations and affects; but as human activity increases its stock of situations, nature (as pure presentation) becomes increasingly organized and formally reproducible, e.g., simulated by artificial means, forecasted, modified, 'decontaminated' (Marx 1963, Simon 1969).

Without adequate sensory ranges, the question of 'what happens?' becomes a metaphysical dilemma: 1) the idealist argues that nothing (significant) happens without observation; phenomenological strains of idealism simply bracket the question out, and stick to forms of appearance or 'consciousness of' (Husserl 1969; see Derrida 1967 for critique). 2) The realist argues that physical activity happens systematically, irrespective of the observer, which is why formal recurrences (that formulae referentially fix) are translatable across disparate observers and cultures. 3) The pragmatist (drawing from idealism's plasticity and realism's generality) argues that 'something happens' (within a local system of activity) which may likely affect an observer's organization (e.g., 'a body gets sick', 'a containment field is breached'). However, if the observer *acts in time*, 'what happens' may be deferred to a later date. Understanding how to defer what happens requires an ability to diagnose causes from effects by a temporal regression of incidents: e.g., 'Ouch! What was that?'

Dialogical relations, Deliberative style and Analogical networks:

Which dialectical aspect came first: analogue, dialogue or deliberate monologue? The order depends on what we intend our analysis to accomplish. For the situated observer, dialogue grounds all models of inquiry: physical encounters (or contact points) between an agent and her environment translate into *organized* positions within her sensory range. A dialogical agent substantiates herself by maintaining a body (or point of intercession)

between her sensory range and the environment; this body discloses means of operating (signs, targets, tools, 'heuristic principles') and expresses environmental forces (e.g., pain warns the agent of disorganization).

An agent in dialogue with a metastable environment continually expends resources to maintain her body's hold on reality; she must also keep track of advantageous positions that formally recur within her sensory range. Thus, there is a relationship of possession between the agent and her body: she subjectifies it, masks it and 'puts on a face' to express her cause (affect, desire, ruse, ethic, belief, etc.). Others individually situated within the environment observe her efficient subjectivity through the trace of signs she 'gives off' (Goffman 1959): e.g., acts, gestures, grimaces, nervous twitches, utterances, transmissions and so forth.

Thus, the dialogical relations that situate an agent across series of encounters are potential paths within causal networks that an agent simulates when schematizing the organization of events; an ability to model causal networks emerges once an agent realizes that analogous forms of inquiry can be mapped onto each other (e.g., samples can be used to infer populations). An agent builds causal networks by connecting disparately situated lines of dialogue whereby preceding series of encounters generate signs that anticipate probable situations and increase the agent's likelihood of preventing future problems. Analogical relations extend an agent's ability to substantiate a body from situated tokens to include thematically conceivable positions of dialogue beyond her sensory range. Through analogical relations, an agent's organization includes territories beyond her immediate sensory range that she maintains by virtue of causal networks extending from points of contact within her present situation to incidents of the past and

plausible forms of the future: e.g., ‘when I am nervous about a possible situation, I get stomach aches’. Thus, substantiation becomes cinematic: 1) causality is an infinite space of variable positions (i.e., combinations of past, present and future) that an agent configures according to 2) effects she intends to actualize through networked sensory ranges (e.g., vision + chlorine meter), in order to 3) modify the environmental forces they deliver (e.g., chlorine, water, bacteria).

As a result, substance becomes economical; the networked body is a decentred locus of exchange between conditions and constraints, and does not necessarily manifest ‘where the action is’: e.g., an agent performing calculations loses track of her breathing, her posture, and ‘what’s going on around her’. Moreover, she has the ability to weigh her body against others and organize their relations within a domain or generic space of coordination: e.g., physical encounters with water become ‘hydrodynamics’, ‘swimming’, ‘drowning’, ‘identifying potable water’, ‘hygiene’, ‘contamination’, etc.

An agent does not stop at modeling causes within her sensory range or inferring environmental forces from situated constraints; she models her modeling process to improve learning rates, orders procedures into methodological arrays, formulates evaluative schemes to assess information, reconfigures tokens of structures and operations from updated information, documents inquiries (e.g., how positions change over time) and develops a canon of representative events to facilitate judgement. Each of these modeling procedures couples with actual situations to form economizing technologies that attend and facilitate the agent’s dialogical information process: e.g., filing records of incidence, the agent *knows* that some situations emerge along a periodic

cycle, while others express anomalous circumstances (given her domain's current stock of situations).

An agent organizes means that extend her activity (and sensory range) as if they belonged to her own body (e.g., eye glasses, hearing aids, car, etc.). Organization establishes common referents or goals of effective activity. Though agents are identifiable by their activity as material causes (e.g., an inspector, a chlorinator, a microbe), many also deliver the efficient cause of a metaphysical agency or method of actualization. Thus, analysis configures two systems of position within a single organization. The physical system of agency constantly demands resources to defer mutation and degradation: e.g., agents *need* to eat, defecate, sleep; they succumb to diarrhoea and cramps from contamination; they grow and break, speed up and slow down. But the physical system's identifiable materials (e.g., parts, resources, waste, etc.) and the possible efficient causes they signify (e.g., laws, needs, feelings, intentions, etc.) belong to a univocal code.

Though disparate causes, materiality and efficiency are intercessors whose point of intercession is judgement. A judgement correlates 1) metaphysical conditions that calibrate interpretations of activity (e.g., 'maximize outcomes and minimize expenditures'), with 2) physical constraints that inform an interpreter's sensory range. The disparity between efficient model and material reality, metaphysical condition and physical constraint, defines an agent's problematic existence. Each problem culminates in judgement. Thus a series of judgements allows us to track an agent's 'deliberate style': how she effectively navigates through an environment, the kinds of goals she

effectuates, the procedures she habitually ‘falls back on’ and how she responds to emergencies.

Thus, situations involving multiple agents effectuate deliberate forms of inquiry beyond dialogue. A disputant organizes statements about her position that entail propositions about her world and what she intends to do. In general, she proposes her position through her activity. A sophisticated disputant understands that others are ‘trying to *figure* me out’ and consciously crafts a monologue or presentation of self to manage the impressions her activity inadvertently ‘gives off’ (cf. Goffman 1959, 1967 on face-work: saving face/losing face). Because an encounter with others is agonistic and uncertain, disputants target a general audience and use figurations built around standard locutions, examples of precedence and established forms of judgement (axioms). Thus, expressive performances are often scripted monologues that connect standard figurations with past dialogical searches: prior to disclosing her position or summarizing positions under a categorical expression (e.g., good/bad policy) or thematic figuration (e.g., panegyric, condemnation, patriotism), a sophisticated disputant will interview *typical* audience members to test the effectiveness of particular statements and measure the probity of specific propositions (e.g., ‘who do you think is responsible for maintaining water distribution systems?’).

For example, prior to the formal execution of Public Inquiry, Commission counsel catalogues all forms of permissible evidence, interviews witnesses to gauge their perspective (of the dispute), and prepares interrogative scripts to match the propositions that witnesses disclose during interviews. Thus, counsel anticipates the deliberative style

of witnesses (e.g., their concerns, favoured figurations, expertise, authority) prior to executing formal interrogation (O'Connor 2002a 483).

What kind of subjectivity does E. coli mobilize?

Through our inquiry into the Walkerton crisis, this question distributes a concept of E. coli across disparate thematic configurations. 1) E. coli is an 'indicator organism' whose occurrence microbiologists and general lab technicians code as a sign of possible fecal contaminants. In this role, E. coli's presence attunes a technician to the likelihood of more lethal contaminants involving 'fecal matter' (e.g., Cryptosporidium). Thus, E. coli is an indicator (under the employ of interpreting technicians); but it is also an organism whose activity not only distributes signifying events but also controls territories, exchanges information and alters environmental forces. As an organism, E. coli can be damaged and weakened (viz. chlorination); but its trail can also be confounded with other 'micro-organisms'. Thus, the presence of E. coli's signature (the events or sensory tokens that situate its presence for humans) and the (schematic) information it carries about 'other contaminants' for technicians may become distorted and degraded as the organism's lifecycle develops. Though general lab technicians rely on an absolute domain of prefabricated ontologies to identify E. coli (e.g., fixed colour concepts; Hach 2001), microbiologists have learned to adapt domains to evolving 'indicator organisms' like bacteria. A lab technician unfamiliar with microbiological domains relies on a concept of E. coli that is general enough to override as many variations as possible: e.g., a Presence/Absence test offers a signature of E. coli that overrides variations in protein structure among different strains of the bacteria by tracking a generic sugar producing activity common to all forms of the bacteria. As a result, this generalization fails to offer

the technician a way of distinguishing 'commensal' and 'virulent' strains of *E. coli* (e.g., the lethal O157:H7).

2) As an organism, *E. coli* partakes in the distribution of genetic lineages by differentiating into various mutative strains: e.g., commensal or virulent. The majority of *E. coli* strains are commensal. All humans have commensal strains of the bacteria living inside their intestines. This situation problematizes the epidemiology of *E. coli* and sociology's conceptualization of subjectivity. The body of a human organism provides territories for multiple, distinct micro-organisms such that theorists cannot refine human subjectivity to a corporeal substrate without either: A) breaking subjects down into ever finer gradations of micro-organic relations between communicating cells, invasive bacteria, viruses, etc; or B) eliding the micro-organic composition of human bodies altogether by generalizing the body to a mere sign or form of materiality/reality (e.g., corporeality, sexuality, gender).

A human organism is trans-formative however: consciousness surveys formal (spatiotemporal) relations through a sensory range that bind the organism to its environment; but sensory ranges are plastic and not commensurable with the extensive physicalities they disclose (part/whole configurations, micro/macro levels of analysis). Every sensation is an absolute intensity and cannot be neatly decomposed into subcomponents without altering one's perspective or frame of analysis (Deleuze 1994: 26). Sensation belongs to the organism, even though it registers physical forces that burst from the environment. Consequently, the subject of sociology emerges directly from this intensive, sensory experience to inhabit the metaphysical domains of ideas/forms, concepts, and themes that anticipate (and are informed by) sensation. Thus, when an

epidemiologist locates a ‘virulent’ strain of *E. coli* O157:H7 alongside the wall of a human intestine, we must locate an exchange between organisms (a reterritorialization that alters the activity of human organism and micro-organism), and not simply an invasion of a human subject’s corporeal being.

The epidemic that characterizes a community of *dis-ease* hinges upon an intimate communication between disparate (in this case, organic) beings. The symptoms that erupt throughout an infected human body – diarrhoea, hemorrhagic colitis, abdominal cramps, fever, hemolytic uremic syndrome, etc. – help the epidemiologist isolate the bacterium. The symptoms situate a diseased patient but also conceptualize the activity of an invasive bacterium. Human and bacteria are intertwined through the signs of their common corporeality. Again, subjectivity becomes problematic, this time for the sociologist of medical science. The patient is not simply a victim of external entities; her body hosts countless bacteria, many of which assist intestinal processes, waste management, etc. Moreover, when a sociologist encounters disease, the events that inform his or her conceptualization refer to a symptomatic translation between patient and bacteria: it remains indeterminate as to where the bacterium ends and the diseased patient’s subjectivity begins. For example, a fever is a human organism’s reaction but it occurs as a response to the bacterium’s intrusion; thus ‘call and response’ form a dialogical category of symptoms.

3) Because *E. coli* signifies a genetic distribution of mutating replicators (that develop strains), it alters the sociologist’s understanding of knowledge and practice. Domains are directly interfaced with sensory ranges (cf. Jackendoff 1987: 108 on the bidirectionality of human information processors). As such, domains can potentially

mutate in response to the emergence of environmental dynamics (e.g., new strains of E. coli are new forms of medical science). The subject of sociology must reflect this adaptive information process, as an agent actively situated in anticipation of a metastable environment. E. coli presents a metastable environmental force: e.g., for humans the micro-organism signifies a category of often benign entities ('waste managers') that sometimes disguise mutants which, although of the same kind, are capable of 'wasting human bodies from the inside'. To mistype a situation involving E. coli can be fatal for human organisms; thus, E. coli's general form designates a disruption of mutually exclusive ontological categories: benign and fatal entities are of the same kind.

Chapter 4: Introducing a Body:

General:

In its generic form a body is an aggregate of substance. There are three kinds of substance emerging from an evidentiary process of substantiation: 1) physical activity, force, non-organic nature, energetic substance, etc.; 2) metaphysical subject-predicates or sensible forms of dialogue between actor/patient, observer/appearance, etc; 3) body of law or verifiable series of witnesses that relieves the tension between kinds (1) and (2): i.e., 'by the law of physics (3), what you observed (2) really occurred as a displacement of forces (1)'. As soon as agency involves the second kind of substance it gains a capacity for understanding or typing forms of occurrence within a sensory range, thus differentiating subjects and predicates from intensive sensory fields. The first kind of substance does not entail sensation; the second kind does. Moreover, understanding is synonymous with intelligence (Kant 1990) or a capacity for procedural activity, i.e., 'normal behaviour': not simply random encounters of force, but habitual responses to stimuli, instincts, games, strategies, etc; understanding signifies a doubling or dual positioning of human being.

We *under-stand* a situation because we can observe ourselves operate within it.

Prior to the differentiation of tokens and types, a subject of predication emerges.

Predicates differentiate from overlapping fields⁹ that subtend the sensory range, to disclose a problematic space where physical activity becomes subject to a questioning

⁹ I use the term *sensory field* to denote a process (e.g., spectra, sound, light, colour, odour, body warmth, visceral feeling, etc.) that informs aspects of the sensory range. Thus, sensible forms or spectral bodies differentiate from correlated fields to form subject predicate combinations that collect multiple tracts of sensation: e.g., the patient has a fever (abnormal body warmth), looks pale, coughs, smells of perspiration, etc. Sensory fields denote physical activity and inform typifications of understanding (sense): e.g., the doctor knows the patient has a fever because the thermometer reads 40°C, a token that correlates with the patient's perspiration, pale complexion, etc., to form a type of fever. Sensible forms and types of tokens comply with Kant's distinction between faculties of sensibility and understanding (Kant 1990). Following Kant I make the distinction while emphasising the interdependence of the faculties: sensibility without understanding is ineffective in situating activity because it cannot translate encounters into concepts.

observer: ‘what will happen next?’ (cf. Dewey 1938: 168 – 170 on interrogatives). Consequently, types of tokens (formal recurrences) converge upon the space to situate the indeterminate activity within a determined procedural series (according to schemes/methods): ‘that’s (*type*) what it (*token*) does.’ We critique our activity (e.g., as procedural conduct, duty) to optimize our physical position (e.g., survival, comfort, ‘staying above equilibrium’) and satisfy the efficient cause of our procedures (e.g., ‘achieving goals’, ‘avoiding penalties’). Efficiency varies according to protocols of the game in play: e.g., ‘does this game affect my interests? Do I concern myself with a share of this community? Do I build a common referent with the participants, correlate with their norms and govern a sentence with them?’ If not, then optimizing position is less of a concern and procedures will lead elsewhere, to satisfy other interests.

Furthermore, as witnesses of law our position involves a subject of enunciation (who testifies, reports, etc.), multiplied by the number of subjects attested to. ‘What kind of subject do you assume when speaking in public?’ ‘Do you tell the whole truth when speaking to someone you’ve never met?’ The detail of a report presents an agent’s way of typing her situation, how others affected her and how she interpreted their activity. Thus, behind each subject of the report is a subject of enunciation, an agent, an author, a speaker, an actor and strategist.

In the role of spectators and audience members, agents receive transmissions from the subject of enunciation. Spectators must transcribe the report by recursive connections, from their semantic types to referential tokens¹⁰ within the report’s textual medium (‘not just what the report says, but how it says it’ to anticipate why it says it); thus spectators anticipate tokens within the text by signification. Signifying tokens are

¹⁰ *Referential tokens are signifiers of concepts and referents in types of situations*

significant for the interpreting agent only because she judges them to be: so when formulating his text or utterance, the transmitter's intent could have anticipated her interpretation incorrectly. Nevertheless, signifying tokens draw the transmitted text through a conceptual grid of methods and schemes that a spectator uses to understand a text and strategize with regard to possible responses.

In general, each position (or place) corresponds to a domain of operations that frames the three kinds of substantiation: 1) the physical body belongs to non-organic nature, the immanent spacing of encounters that is reality (thus, its domain is an empty set: the disparity between physics and metaphysics); 2) the metaphysical subject (sensible form) belongs to a problematic space: it begins with an indeterminate situation, surveys its domain and attempts a heuristic search for various types across the sensory range: each subject terminates the search with a solution that alters the path of physical activity by creating a new problematic space and form of subjectivity; 3) the body of law occupies an archival space, where the testimony of witnesses updates conditions about the universe of domains to which laws are bound.

Witnesses set precedence, testify against malpractice, verify contracts, survey agential responsibilities, and maintain sentences that preserve the common referents of their organization. Witnesses are called during a deliberation to exemplify a situation (report) and verify the claims of a particular disputant. Thus, the body of law is social because it legislates a community of disputants (not all of which are human) who each share a portion of some common referent (e.g., resources, water, knowledge, etc.).

The three kinds of substance (or substantiation) proceed dialectically from one kind of body to another. Non-organic nature offers a potential for organic beings with

sensory ranges; it is metastable and prone to individuations or mutations (Simondon 1995). In actuality, analysis begins with organic being, for we must *abduct* our non-organic nature from encounters within a sensory range. *Abductive* forms of inference (i.e., inferring a reverse temporal order from effect to cause; Pearl 1988) hinge upon a dialogue between an observer and the event she senses; however, observers don't have to be human or animal: e.g., a smoke detector has a sensory range that registers types of events along the lines of 'how much smoke does it take to make a fire?' Thus a SCADA¹¹ expert system coupled to the Walkerton PUC water distribution system registers levels of chlorination, turbulence, and consumption rates at different contact points throughout the physical distribution system. Like the smoke detector, it maintains a sensory range within normal limits that define the particular events it registers: e.g., 'how much water activity defines turbulent?' There must be a homology between observer and event, otherwise there can be no formal relation to abduct or cause to infer. Homology is between two and does not refer to an authority who can legislate a cause from beyond the situation they comprise together; as a result, the two are organism/environment, physical/metaphysical, self/other, with both components necessary for establishing situated existence within sensory ranges. The SCADA system and smoke detector examples stop short of a contained homology with their respective environments. For example, SCADA requires a PUC operator to set the normal limits that define possible events (e.g., of turbulence, and an optimal distribution *viz.* consumption rates). Unless an 'artificial intelligence' can reset its normal limits by adapting a dialogue with its environment, it will always require a third (human or at least a networked command structure that eventually leads back to a human) for

¹¹ *Supervisory Control And Data Acquisition*

reprogramming and authorization. Like a smoke detector, SCADA simply maintains a sentence (common referent or fragment of dialogue) established between the PUC operator and his environment. Though SCADA surveys an environment, it does not work for itself and has no way of adapting the conditions of surveillance to understand abnormal readings, redefine situations or alter its domain.

The body of law hinges upon a dialectic whose product is distinct from homology. It is analogical at its foundation because the law re-establishes the disparity between organism and environment, physics and metaphysics, 'what you observed' and 'what really happened'. The body of law emerges through a deliberative form of dialectic. It involves multiple disputants, each with their own claim to 'what really happened'. The disputants call on witnesses or subjects of specific effects (predication) who can testify on behalf of an agency, analogically involved in 'what really happened'. Testimony is recorded and assessed (by dialogical understanding and deliberate reasoning) for a faculty of judgement outside the dispute. Each dispute is a case whose precedence is relative to series of disputes and judgements, from a historical past to its anticipated future. Judgement places the dispute in an appropriate system of related (mutually informed) cases. Series of interrelated cases inform and optimize general schemes and methods that condition future inquiries: e.g., if the Walkerton Inquiry's computer system for text retrieval crashes (over 1 million documents of submissions), it will be noted by type and frequency of occurrence, etc., then repaired or forfeited. As a result, the body of law is a template for bodies of science; both retain series of cases in an archival space, where each case summarizes and resolves the problems of multiple disputants (or

subjects of judgement) by drawing analogies between agencies, instituting sentences of common referents and verifying claims. Here is one model of the archival space:

Science is a seamless web: each idea spins out to a new research task, and each research finding suggests a repair or an elaboration of the network of theory. Most of the links connecting the nodes are short, each attaching to its predecessors. Weaving our way through the web, we stop from time to time to rest and survey the view – and to write a paper or a book (Langley et. al 1987: preface).

Thus, we now have a clearer understanding of the three kinds of body or aggregates of substance that our substantiations produce. However, each disputant has a specific experience of her body that intervenes upon her dialogue with others (her situated information process), and her deliberation before a public community. This experience problematizes how she schematizes her own substance.

Specific:

The human body is a sign generator, but there are different kinds of bodies subtended to each *one* of us. Our first body refers to a physical, non-organic displacement of energy; it maintains our immanent passage and discloses the n^{th} domain of every organism's sensory range. The n^{th} domain is always an empty set that circumscribes the ellipsis of experience, the ... spacing of encounters that exceeds sensation (Jean-Luc Nancy 1997). Our physical body is always one step beyond the terminus of every signifying series we maintain: e.g., even the birth/death rites and ancestral spirits that precede our symbolic and social bodies (cf. Baudrillard 1993) fail to catch up to our physical non-organic nature; that is, 'energy cannot be created or destroyed'. The senses that articulate an organism's sensory range all converge upon the physical body's path to register a sense (understanding) of its passage, e.g., 'is that just a projection of photons (hologram) or a woman? What is that woman doing?'

A physical eye cannot see itself, only its reflection; thus, the distance between a physical act of seeing and its metaphysical registration, though microseconds in duration, is enough to ensure physical activity's absolute precedence over sense. However, this non-organic body of human beings (their activity) coordinates with temporally situated, spectral kinds of bodies (or sensible forms); each spectral body belongs to a domain-specific organization that guides physical activity for maintenance and repairs. A spectral body forms a target upon emerging from the dialogue between an organism and its environment. Thus, activities like reparation and maintenance require physical beings with sensory ranges.

A being capable of repairing itself must have a capacity for sensing damage and assessing states of normality (e.g., health), targeting or differentiating its body, tools, remedies, etc., within spectra or sensory fields that subtend sensory ranges. At its core, damage is a physical displacement of forces (loss of function, energy, systemic cohesion); but for an organic being like humans, damage retains a spectral body, a cluster of sensory images (diarrhoea), a sense (infection), an efficient cause ('something in the water'), and a counter-effect or remedy (electrolyte therapy). The terms of this second series are metaphysical because they require the registration of a *physical collision* (microbial contact) with its *sensory effects* ('gut wrenching pain'), alongside the *fixation of referents* (the ratio of forces or causal network behind the event: 'it was the PUC Manager', 'it was cow manure', 'it was the government'). In the case of microbial contact, most patients fail to recall when the event happened. They can only place the occurrence within an interval of time: before 'the symptoms, pain' and after. Thus, unlike a blinding flash of light that recognizably incapacitates an agent's activity,

microbial contact is a 'silent, invisible event' with equally incapacitating effects but less tangible, spectral traces.

All domain-specific bodies are spectral because they consist as differentiations of sensory fields (or sense formations); even the 'invisible spores' of *E. coli* O157:H7 leave a spectral trace (signature) of their passage that appears within adequate sensory ranges: e.g., a microbiologist's microscope and chemical bath identify flagella, particular proteins along the cell wall and the production of lactose; each of these tokens 'makes sense' of a type of microphysical activity (protein synthesis, swimming, sugar production) that specifies a strain of *E. coli* within the sample. Thus, a Medical Officer examining a patient is not simply a seeing body with eyes but a surveying body of vision that *knows* what domain of symptoms and signs to 'look for' and which to 'overlook' or ignore (thus optimizing procedures); though his patient feels 'one stomach ache like any other of similar intensity', the doctor correlates symptomatic pains with stool samples, the patient's habits (e.g., hygiene, food sources) and age (e.g., children and the elderly are more susceptible to *E. coli* O157:H7 than middle-aged adults).

There are as many spectral bodies as there are inflections (types, schemes) of vision (or methods of seeing). Though I have only one physical body subtending the ocular mechanism that informs my vision, I can interface my ocular mechanism with other physical bodies (machines) that modify and expand my sensory range (microscopes, spectrometers; cf. Guattari 1995). A spectral body is any form of appearance within the sensory range that requires sustained activity to exist (e.g., refuelling, maintenance and repairs). This is paradoxical because, substantially, the spectral body is a metaphysical simulation (reification) of physical activity. A physical

body (activity) subtends and maintains spectral bodies (subjects): ‘I am a father, a doctor, a male’; each subject has a bounded set of attributes or ways of modifying (qualifying and altering) physical bodies. But qualifications and alterations are substantiated within sensory ranges, despite modifying real physical forces. For example, to know if an autoclave is functioning: 1) check the light, 2) make sure it’s plugged in, 3) listen for the mechanism, but 4) never risk exposure by opening the hatch if you believe the autoclave is on. Thus, a physical body (cellular activity) cannot calibrate and condition a particular activity without taking its image (spectral body, appearance) for reality (‘I am risking radiation exposure’).

Analysis refracts the physical body into an organization of nervous and metabolic systems, information processors, nutrient circulators and synthesisers. Each system corresponds to a real activity or process (circulation, synthesis, absorption, movement, identification). But, as an immanent form of reality, activity exceeds these schematic systematizations of physicality; thus, as an immanent form of reality, schematization localizes sensible forms (matching the effects of physical activity with diagnoses, predictions, etc.). For example, sentences like ‘I feel sick’ or ‘I’m aroused’ evoke situations of corporeality for most English speakers, but neurological examples have shown how contingent these sensible forms can be if sufficient connections of neural nets, chemical flows, and so forth, fail to actualize. Here is a case documented in Donald D. Hoffman (1998: xi):

After his stroke, Mr. P still had outstanding memory and intelligence. He could still read and talk, and mixed well with the other patients on his ward. His vision was in most respects normal – with one notable exception: he couldn’t recognize the faces of people or animals. As he put it himself, “I can see the eyes, nose, and mouth quite clearly, but they just don’t add up. They all seem chalked in, like on a blackboard.... I have to

tell by the clothes or by the voice whether it is a man or a woman... The hair may help a lot, or if there is a moustache..." Even his own face, seen in a mirror, looked to him strange and unfamiliar. Mr. P had lost a critical aspect of his visual intelligence.

Thus, each spectral body (e.g., the face Mr. P cannot register) exists within a normal distribution of physical activity (e.g., are neural networks functioning adequately? Are neuro-chemicals circulating at sufficient rates?) Only when activity diverges from its normal distribution (to become a problem, a malfunction, a mutation, a discovery) do we notice the complexity of constraints involved in maintaining the form of our physical body; we discover which forces need replenishing, which are aberrant, which could be optimized. But all these inquiries and formalizations (ratios) of the physical body's activity return us to the spectral wake of its passage (and what the spectator is able to register).

Moreover, humans belong to a body of law that socializes (even humanizes, cf. Lyotard 1983) activity; thus, their spectral bodies attend a normal distribution of collective activity by forming series of procedural standards, schemes/methods, morals, etc., that belong to domains of multiple agencies: e.g., if Mr. P fails to register faces he 'can only function normally' in a hospital because his activity – the range of his physical body – is procedurally incompatible with a North American society that facializes sensible forms of expression and cooperation (Deleuze & Guattari 1987); yet, as domains are specific, an ethnographer might ask: would Mr. P's 'malfunction' work as a sorcerer or priest under a different society of domains?

Each spectral body attends (makes sense of) an activity of the physical body, (e.g., diagrams of the nervous system, mind/body dualisms, etc., are sensible forms that make sense of their own sense of making sense). The physical body's activity inscribes

the signature of each spectral trace. Yet, each domain-specific sensible form claims a share of existence (experiential being) despite belonging to sensory fields that simulate the physical body's activity. First, an event converges upon the body (as a ratio of forces) and its cause becomes abducted within the sensory range. We start with effects and infer causes, to infer further causes along a recursive arc. Effects connect to form series of sensible forms. We configure effects into types of formal recurrence (similar forms), whose tokens afford the organism a currency for entering situations, preventing events and economizing affects and resources. Thus, we maintain exchange rates from series of effects to other series of effects, depending on the task at hand and the agencies involved in the task's organization.

A human body is always more than the n^{th} degree of its current physical state (in the circuit of activity); its passage subtends a metaphysical replication of non-organic substance, a trail of subjectivity: spectral bodies of decomposed experiences, errant selves, redundant procedures, tactical methods and schemes. Each subject articulates a domain and body of law that surveys an agent's sensory range and codifies situations across specific sensory encounters¹², thus creating signs and connections from even the most minute and obscure occurrences to periodic cycles and seasons.

For each significant connection of physical forces, a spectral intercessor (subject) forms a body of law by observing the connection and witnessing to the ratio (e.g.,

¹² A specificity of encounters implies temporality; types of counterfactual situations and possible worlds whose contingent arrival (distribution) depends upon an agent's probabilistic computations. Thus, even though we synchronize with a 24-hour work schedule we each devise idiosyncratic ways of watching temporal incidents (watching for the probable, hoping for the possible). Moreover, each spectral body up to the n^{th} degree of physicality entails a spectator, a position of perspective (understanding) within the sensory range that types or registers events. Bodies of law authorize specific positions to witness, such that a report or testimony from their perspective is verifiable (Agamben 1999), relative to some domain of codes (conditions) across the sensory range, e.g., the witness's registration of an event demonstrates a law, contract, protocol, or verifiable truth-procedure.

computing a correlation coefficient, informing aspectuality, filing a report). Each body of law auto-conducts itself within the sensory range: a network of secret signs, a discrete language of symptoms, traps, and colours maintains its own limits, searching for entities that satisfy its law/programme (cf. Uexküll 1956). Entities are subjects or nodes belonging to a discrete heuristic procedure: 'connect the dots' whereby the subject of connections connects itself. Colour within the world is a sign of discrete elements: we sort entities, organs, metals, painful occurrences and delicious tastes by their colour, timbre and resonance with other elements. As such, we cannot claim that signification does not belong to the world because it is interwoven with physicality to form its existential fabric (surface effect) and the possibility of understanding: signs are codifications of physical effects; effects differentiate in the sensory range from spectra of images, typed into sense.

Thus, as Kant (1990) proposes, understanding is intertwined with sensibility. Sensible forms constrain and affect how an agent situates their appearance before becoming tokens of situated understanding (structural/operational types). Sometimes a sensible form overwhelms an agent's sensory range such that it overrides situated understanding to signify a general concept: e.g., most westerners do not differentiate types of diarrhoea nor do they have 'routine procedures' in dealing with the problem; thus, diarrhoea is 'embarrassing', 'threatening', 'debilitating', etc. General methodologies are created and preformed to 'stop diarrhoea before it starts': e.g., 'got diarrhoea, take Imodium'. The medication is a concept, not a type of situation; the agent takes it or applies it like a tool that embodies a condition of reason. Procedural understanding involves a second series outside the indeterminate typifications of

diarrhoea (e.g., 'when I'm sick everything is cloudy, I just feel a dull pain all over and I don't have a clear sense of the situation'). The second series subtends the general form of medication: e.g., swallowing pills, reading instructions to know when to take them, doubling the dosage if one's an adult. Medicating procedures attend other general forms, such as taking one's temperature, lying in bed, sleeping fitfully, taking cold showers, sitting on the toilet, drinking water (a paranoid state if you're in Walkerton!). Thus, though diarrhoea makes for 'sloppy procedures', its appearance triggers an agent's conceptual strategies (e.g., 'rest, drink plenty of fluids and take your medication').

The world of sense belongs to a physical body's sensory range; this doubling of sensation (physical/metaphysical) generates possible experience for each human being. A world can thus be ordered along possibilities and probabilistic calculations of recurrence or forgotten within an affective haze of intoxicating forms. Physical substance is an immanence that subtends all bodies of law, such that the subjectivity of each spectral body attends to a share of immanence. But immanence exceeds registration: we can only ontologize our physical body as an n^{th} term whose continual displacement (energy) maintains the convergent (yet disparate) series of metaphysical conditions and physical constraints. However, our spectral bodies each conduct their own disjunctive synthesis of law (conditions) and chance (contingent constraints) that culminates in their 'possession' of a share of physicality; each can invest an immanent body of activity (thus replacing the n^{th} term) with authorized methods and schemes; but only if a sufficient combination of conditions and constraints has set the stage of encounters (authentication).

When I act out of duty, 'who is the subject?' By following a method, my physical activity effectuates the conditions of 'someone else', an author of the method. This is the meaning of possession or authorization. My procedural activity connects my physicality to a body of law shared by multiple agencies. Each agency, socialized by the body of law, participates in an exchange of conditional forms (schemes, methods, expectations) that normalize my understanding of situations and authorize my domain specific activity (e.g., 'play by the rules'). Through a body of law, my activity develops a verifiable signature (of spectral traces) that is inextricably linked to a community of witnesses. Each witness potentially verifies my position and work within the community, and I can (and sometimes must, according to protocols) do the same for them.

Thus, law stabilizes local games of coordination within the uncertain network of spectators. When spectators file authorized reports according to expectations of equilibria, they inform a particular community and attest to its sentence. The network is a metaphor but pliable enough to suit the peculiarities of any group of spectators. Relations within the network or web consist of nodes and paths. Nodes represent agents that divert flows of information (e.g., energy, statements, currency, resources) and effectuate translation from one path to another. There are varying tensions throughout the web among particular sets of nodes. Each set is a game of coordinated exchange. Paths of exchange represent varying stages of equilibria: 1) paths may be degraded and effectuate an uncertain information transfer; 2) paths may be optimal and effectuate maximum efficiency at minimum cost relative to the local game in play; 3) paths may have been optimal but are losing effectiveness due to changing relations within the game (e.g., nodes are replaced); 4) paths may have been sub-optimal but are beginning to

increase certain payoffs due to changing relations; 5) paths may have not been configured by the transmitting node, though interceptors consider its transmission an actionable figuration (e.g., a spy interprets 'impressions given off' as 'true intent'); and 6) paths may effectuate situations counterfactual to a node's general design.

A path represents meaning; a network of related nodes represents a grammar; grammars generate rules of position. Rules are not simply laws specifying formal recurrences; they are calibrations of reality which specify a calculus of agency that conditions the information process of situated agents (who are positioned at certain points of exchange within a game). The calculus differentiates positions, establishes probable expectations, and specifies a range of effective procedures within the game. An agent who fails to 'measure up' may incur penalties, but in reality she is playing a different game by a different calculus of positions. Following Wittgenstein (1974: 149), we can connect the network metaphor to a concept of meaning. The calculus entails a normalization of interpretations across a set of coordinated nodes (the local game of exchange). An interpretation never belongs to an isolated agent. To effectuate an interpretation, an agent has to be positioned along a path of potential exchanges (including nonhumans; cf. Latour 1984; Akrich 1993). Meaning is displacement, an act that belongs to a specific calculus of exchanges between coordinated nodes. An agent means to accomplish a task; an agent means to travel to point X, an agent means to exchange this for that, etc. Meaning sends the agent to various positions within specific games. When an act is meaningless, the agent's choice or lack of choice effectuates a position that does not belong to the game in play.

The metaphor of nodes and paths must be understood as a dynamic process.

Nodes or points of exchange can be displaced; paths can degrade; games can destabilize and become inconsistent, forgotten. Most agents constantly shift from one situation to another, without intentionally adjusting the calculus of positions. Exchanges and expectations are self-organizing: an agent learns about the rules of a specific game upon observing experienced players and replicating their choice of positions; failure is an incentive for agents to self-modify and adjust their expectations to fluctuating equilibria. Of course, the calculus of positions depends on how an agent initiates the game: how she types events, observes other participants, and evaluates positions. Meaning builds from sensible foundations: e.g., if a PUC Manager misunderstands how levels of chlorination correlate with levels of microbiological contamination, then he will be unable to coordinate with the MOE, no matter how sincere he feels (WIA00/12/18: 21). However, meaning requires an awareness of value (e.g., MOE compliance guidelines) and cannot be reduced to relations among formal recurrences within an agent's sensory range.

The correlation between chlorination and contamination achieves a point of equilibrium because the MOE (as a governing body) expects specific situations to comply with a truth-procedural sentence; moreover, the sentence configures correlating variables into thematic constituents (minor premises of a verifiable syllogism). For example, 'chlorination prevents microbes from contaminating water distribution systems.' This premise hinges upon an evaluation: 'a contaminated water distribution system is unsafe for public consumption'. Thus the MOE, in line with an even more general sentence to 'protect the public from environmental hazards', disperses agents across the network to

monitor the correlation of PUC chlorinators with notices of contamination (from commercial labs, Health Unit inspectors, public complaints).

The activity of MOE agents becomes an effort to coordinate with local PUCs across Ontario. In order to comply with the MOE's evaluation of contaminated water, PUC operators must expect that MOE agents will expect them to calculate chlorination levels according to MOE conditions for preventing microbial contamination.

Chapter 5: Two Labs:

Introduction:

Within deliberate forms of inquiry, multiple disputants entail multiple confrontations across disjunct problematic situations (cf. Dewey 1938: 170 – 171). Each disputant approaches deliberation from his or her own stock of situation types. As a result, the scheme of deliberation (e.g., ‘to be careful, negotiate conflict and understand what *generally* happened’) constructs a causal network that accommodates the positions represented by disputants and their local games of coordination, without necessarily accepting the propriety of every position. Disputants require accommodation in order ‘to reach a *consensus*’ or formulate a grammar for dispensing judgement and apportioning values (e.g., blame, justice, compensation) across the field of disputants. Thus despite their disparate situations, disputants form deliberate inquiry in order to generate a uniform standard of judgement: ‘they swear oaths before testifying under the Public Inquiries Act’ (1990 c. P.41, s. 7 (1)). During Public Inquiry, one faculty of deliberate judgement overrides each disputant’s particular set of judgements and their attendant claims: the Commissioner. However, the uniform standard of deliberate judgement does not elide the particular games of coordination that arise between specific disputants.

Though Commissioner O’Connor aligns his judgement of disputes according to a mandate or overall goal (‘What caused the Walkerton crisis?’), his question inevitably infringes upon numerous intervening variables; the contentious issues of each disputant’s partially integrated perspective. Moreover, arguments between subsets of disputants emerge to conduct partial inquiries within the overall deliberative frame. As we shall see, when unallied disputants within the subset claim a right to the activity under question, their partial inquiry manifests a contest to verify whose methods are most appropriate

and/or authoritative. Thus, we encounter a contest regarding the ontological status of lab technicians in a dispute between representatives of the two laboratories who served Walkerton PUC's water analysis requirements prior to the crisis of 2000.

In this section I examine how multiple, incompatible ontologies can emerge from a single locus of experimentation. My case involves two laboratories: GAP EnviroMicrobial Inc (GAP) and A & L Laboratories East Inc (A & L). Walkerton's Public Utilities Commission (PUC) contracted both labs intermittently to analyze ground water samples and identify possible contaminants. Either one of these labs could calculate probabilities of contamination for the PUC, a procedure which the municipal organization could not effectuate internally (through its own agents). Both labs present their procedures within a general domain of chemical analysis that includes organics. However, in the examination that follows this introduction, I produce models that differentiate technical genera (anticipatory themes, conceptual traits) according to each lab's stock of situation types. This method constructs partial ontologies specific to an organization's (each lab's) information process.

GAP concentrates chemical analysis on situations involving micro-organic events. Garry Palmateer, a former microbiologist with the Ministry of Environment (MOE), founded the company in 1995 after the Ministry stopped providing laboratory services for Ontario's various PUCs. Through the uncertainty of provincial reorganization, GAP emerged to take the 'place' of withdrawn MOE procedures¹³. A & L's organizational

¹³ *Place (topos) is a generic term that globally indicates a conjunction of disparate domains and locally indicates the point at which an organization emerges. In this case the MOE's withdrawal represents an opportunity (Kairos) for re-placement. In replacing the MOE, GAP must organize its procedures via the following situations: 1) Municipal PUCs dependent on the expertise of external labs, 2) Micro-organic encounters, e.g., contamination, 3) Doxa: Public opinion and News about the 'privatization' of labs, 4) Provincial regulation: though the MOE withdrew from actual laboratory analysis, its methodology continues to constrain the operations of private labs, 5) Competing labs.*

trajectory predates GAP's emergence. Headquartered in the United States, A & L is a network of strictly offsite laboratories that maintains an international client base. For the A & L network, chemical analysis normally concentrates on soil samples extracted from agricultural situations. However, each A & L lab organizes an array of procedures to meet the activities of potential clients within its locality. Thus, after the MOE withdrew its lab services, A & L's Ontario representatives decided to gather information about various PUCs, model their activity, and develop ground water testing procedures.

By early 2000, A & L became Walkerton's only source of chemical analysis, as GAP had withdrawn from offsite testing to become an onsite consultation agency. Consequently, A & L's Ontario lab became implicated in the reconstructed series of events (viz. media reports, police investigations, Public Inquiry) that represent most plausible worlds (causal conjectures) underlying Walkerton's water crisis¹⁴.

Methodology:

By categorizing their activities within the domain of 'chemical analysis', GAP and A & L assume a common conceptual theme that guides their approach to situations in the laboratory. Concepts are virtual operators (genera, universals, essences, etc.) that

¹⁴ Causal paths can be represented as probabilities and or possibilities. Given information about event *E* and situation *X*, a Bayesian analysis can calculate the probability of *X* given *E*: $P(X|E) = P(E|X)P(X)/P(E)$. Probabilities represent informed choice-constraints within a game of decision: e.g., given my current situation *X* and the tokens it carries, if *E* were to occur what would happen to *X*? Models of possibility trace procedures (operations structures) across possible world lines. Modal logic formally models possibilities as variables (regardless of content) bound by specific syntactic relations (predication, entailment, conjunction, disjunction, negation). The analysis of modal logic tracks extensions of world lines in reference to some intension *C* (actual event: contaminated water) in order to trace *C*'s necessary individuation (the causal path(s) that could have individuated *C*). Thus, possible world lines of *C* would extend to worlds where *E. coli* exists, etc. Content specific approaches, like Michel Foucault's archaeology of knowledge (1969), define possibilities along a plane of enunciation where world lines are correlated with subjective impossibilities (e.g., for Walkerton's PUC the world line in which Well 5 could be 'contaminated' is impossible because Well 5 is not 'actually' a well). Each enunciable world line requires a subject enunciator (e.g., only a water technician can define a world line about turbulence flows in the ground). Nothing prevents the interface of Foucault's archaeology with modal logic: necessity and impossibility are interdependent concepts of possibility constraints under normal conditions.

thematize an organism's intentional consciousness. When analyzing concepts we cannot isolate them as tokens within a sensory range; they evade physical detection. Concepts are metaphysical; they effectuate an organism's capacity for processing information across multiple sets of sensory encounters (situations and their constituent events). But we can track effective concepts because they couple with certain tokens that not only refer to situations but signify cross-situational themes. As such, concepts and themes effectuate a metalanguage that allows a human to organize tokens and types regardless of her immediate situation (e.g., past, present and future are concepts that thematize her history). Nevertheless, the analysis of a human's metaphysical domain(s) requires anchorage in signifying tokens that coordinate concepts with her range of situation types.

My method of analysis differentiates into a language of situations (tokens/types) and a metalanguage of domains (concepts/themes). Situations – containing types and tokens – belong to an organism's sensory range. Within the sensory range there occurs an array of tokens. Furthermore, tokens refer to either structural or operational types belonging to a situation. Structural referents are tokens that present the organism's environment, including other organisms and its own modes of being¹⁵ (auto-sensory: imagination, health, emotion, arousal, phantom limbs, etc.). Operational referents are tokens that present the organism's ways of acting (running, sleeping, climbing, eating, defecating, crying, etc.). Moreover, when my analysis differentiates (sorts, indexes) structures by operations, I am modeling situations; but when it differentiates operations by structures, I am modeling procedures. Thus the situation where 'E. coli turns blue

¹⁵ *The fact that humans can modify their being often allows them to create fragmented, contradictory structures from an otherwise integrated organism: Schizophrenics who hear other voices within their 'own' bodies; Transgenders who 'are' female despite their male genitalia; religious devotees who are 'overcome' by spirits that force self-mutilation, etc.*

after twenty-hours of incubation' is also a procedure called 'Hach Membrane Filtration'. However, there is rarely only a single procedure for every situation and vice versa. Thus, there are two general ways of coding a situation's constituent events. When events occur in a model of situations, they are evaluated as crises, surprises, and so forth, such that agents frame their problem around '*what should we do?*' This entails searching for protocols, codes of conduct, and methods of containment. When events occur in a model of procedures, they are evaluated as malfunctions, sabotage, and so forth, such that agents frame their problem around '*what was that?*' This entails surveying a sensory range to identify mistypes, schematize errors, and cross-reference encyclopaedias (canonical examples of registered or typical events and their possible worlds). Thus, an agent maps an event's location and decides alternate paths, searching for possible landmarks (of past encounters, a communal code, a rumour or possible mirage) that designate encounters to avoid, shortcuts and places of respite, habitable territories, and so forth (cf. Deleuze & Guattari 1987: 380 – 387 on nomadism and cognition).

The sensory range is a field of encounters constituted by a correlation of parallel sensors (visual, audio, olfactory, tactile, and by extension: smoke detectors, electron microscopes, etc.). In and through this range, the human organism encounters an environment, including its own corporeality¹⁶. As each token occurs in the sensory range, it presents and maintains types of situations/procedures. Every situation minimally contains one structural type and an operational counterpart. The rapport between structures and operations is dialogical: as structural referents occur in the

¹⁶ For example, when you cut your fingernails, are they still a part of 'you'? Such a question becomes problematic only in conceptual themes that try to unify situated consciousness with tokens of 'absolute corporeality' that signify 'being beyond sensation'. e.g., a corpse's mode of being can be treated as completely actualized/materialized, but it cannot support intentional consciousness without a sensory range: consequently, it cannot maintain itself and starts to decompose despite containing a vast network of cellular organisms that persists.

sensory range they ‘call’ on operations to ‘respond’ in kind¹⁷. Likewise, an operational referent can place a ‘call’ to some familiar structure: e.g., when a technician pours a ‘purple broth’ over water samples, she wants to see if *E. coli* will ‘respond’ by turning the broth yellow. My description of this process may appear subjectivist but the structures and operations that humans engage and actualize emerge through their sensory ranges¹⁸. I am not claiming the environment ‘speaks to us’ or that physical forces are constructs of sensation; but, after human sensors process environmental information, it becomes formatted into a referential language of situations (tokens/types).

Although types can be structural or operational, they are always sets of correlated tokens: e.g., hearing X, the organism turns to see Y; thus correlated, X and Y become mutually informed as type Z. Types are stocks of information about correlated tokens. Typification parametrizes correlated tokens into ratios of structures and operations that constrain an organism’s information process: e.g., with each subsequent occurrence of X, the organism comes to expect Y or a variation thereof belonging to structure Z; the expectation of Y also habituates the choice of operation B (turning to see) and its tokens. Structures and operations co-constitute each other within their situation: e.g., to see Y upon hearing X the organism must perform operation B.

My analysis of metaphysical domains schematizes concepts from signifying tokens (traits) across situation types. Concepts can form taxonomies of structures, sequences of operations, or combinations of both (techniques, instructions, etc.). Clusters of concepts that mobilize sets of situations form themes. Themes are syntactically driven: they can be expressed as formal variables (signifiers) because what the analyst

¹⁷ *Call and response are concepts derived from George Herbert Mead (1934).*

¹⁸ *I contend that subjectivity and objectivation both emerge through sensation.*

models is constraining relations among variables (entailment, negation, conjunction, disjunction, etc.). As a result, analysts can strategize thematically by establishing series of procedures extending through possible worlds they have never actually experienced (*simulation*: in case your town has contaminated water, send out a ‘boil water advisory’). Modal logic also comes into play when strategizing, because an analyst must conceptualize necessary procedures (e.g., situate herself temporally) before branching into possible worlds of causal conjecture.

As soon as we enter a laboratory, multiple structural and operational types begin mobilizing information about a range of tokens. For example, structural: technicians, microscopes, compounds, beakers, autoclaves, incubators, Petri dishes, white coats; and operational: adding, subtracting, measuring. As we attend to descriptions of the lab, most of these tokens remain ‘unobtrusive’ and simply maintain our intentionality about the situation. We don’t know why a technician wears a white coat or why she looks attentively at a dish through a microscope; nor do we know which jars of ‘chemicals’ line shelving-units above her workspace (they’re an undifferentiated collection of ‘jarness’) or why a Bunsen burner emits an acrid blue flame. But if the situation ‘feels’ right to you (is unproblematic) it is because you have typed it similarly to my description¹⁹. This presentation of the situation could continue indefinitely as tokens increase in descriptive detail, without us ever having to know what themes guide this lab’s activity, that is, what it is actually for or about. To discover domain specific goals and conditions we require a normative analysis.

¹⁹ Here feeling does not necessarily entail coherent conceptualization: sensory tokens combine to form coherent situations; and since emotional states are tokens, feelings are typed. The situation feels consistent, e.g., lacks anxiety, fear, etc., but we can’t localize any traits that explain why.

To reiterate: a token maintains the presentation of a situation type that carries information about correlated tokens. As Gregory Bateson (1972) claims, information is ‘difference that makes a difference’. Typing is a way for agents to differentiate (or individuate) a situation from encounters within their sensory range. An encounter becomes a token once it acquires a referential relation to previously established (i.e., experienced) tokens and the types they belong to. In other words, types and tokens co-constitute each other: types are sets of relations between tokens (e.g., where there’s smoke there’s fire), and tokens are events that guide the agent towards information carried by the situation type (e.g., I see smoke, I smell something burning, where’s the fire?). However, types can overlap to cause referential malfunctions (e.g., I see smoke and flee the building, but the technician is only preparing dry ice). Thus, overlapping establishes indeterminate boundaries between situations because different types can share the same tokens. Consequently, procedural knowledge requires conceptual thematization so that agents can efficiently navigate across situation types²⁰.

What can we infer from the aforementioned lab descriptions? A number of possible worlds emerge: Bunsen burners entail structures that require cooking; microscopes entail entities you can’t see unassisted; an autoclave entails sterilization, which entails contaminants, and so forth. Conceptual operators (negation, predication, disjunction, entailment) differentiate situated tokens into cross-situational traits (clusters of signs) that guide our choice of procedures. Each series thematizes a possible world or interpretation about the lab (e.g., the autoclave is on; maybe the technician was growing

²⁰ *What historical conceptual themes guide my methodology? Tokens and types have been standard tools of analytical philosophy at least since Bertrand Russell (1956); my use of them however, derives from situation semantics (Barwise 1990), although my differentiation of structures and operations originates with Gilbert Simondon (1964, 1995). My use of concepts and themes can be traced back to a philosophy of organism exemplified in Michel Foucault’s *Archaeology of Knowledge* (1969), Raymond Ruyer’s *Néofinalisme* (1956), and of course Simondon’s aforementioned work.*

bacteria; I should leave). Obviously, situations and domains are interdependent²¹. So, why bother analyzing them through distinct methods of analysis? The distinction hinges upon what an intentional organism can do. Intentionality emerges from sensation, but sensation does not confine intentionality. As a result, I can conceptualize encounters in my sensory range through an indefinite series of situations, given just a basic set of types and tokens. Moreover, I can thematize concepts into possible worlds I may not even be capable of experiencing (e.g., eating a round square). To reiterate: different situations can belong to the same domain (e.g., cooking: either she's microwaving her soup or incubating bacteria); structural and operational types co-constitute each other (e.g., cooking bacteria); we group types according to theme (e.g., pasta night: cooking lasagne, buying Chianti, smelling garlic breath); tokens are referents of types, but also signify concepts (e.g., white coat = lab coat; person in white coat = scientist).

Due to the partiality of human information processing, one situation cannot completely typify an entire sensory range, that is, intentional consciousness cannot maintain an infinite number of situations at the same time, despite there being an infinite number of ways to cleave a sensory range into situations. Thus, as I schematized with the blurring of situations, tokens may guide organisms down the wrong path, towards information that does not actually persist in the organism's environment. On the other hand, conceptualization implies an awareness of situational indeterminacy and an ability

²¹ *How does my method of analysis compare with a classical model of semiotics? Saussure divides signs into signifiers, signifieds and referents. My model imbibes tokens with significance and referentiality, while classical semiotics often ignores the point of intercession between these functions by eliding models of situated encounter in favour of generic language structures (e.g., langue versus parole). There is also no formalized metalanguage in classical semiotics. However, I take solace in pragmatist methods of semiotics (cf. Peirce 1933; Recanati 1993) that interface conceptualization and direct reference (e.g., typification) within a general domain of activity.*

to thematize across types in order to alter interpretations (‘first impressions’) and avoid wrong paths and dead ends. In summation:

Type	Individuates situations; informs tokens because it is the set of their relations. Different types can share the same tokens, causing situations to blur. Types approximate a correlation of environmental events, given partiality of information in the sensory range. Types are either structural or operational, thus creating dual perspectives: is the object of analysis a situation or a procedure? It's both; but neither are they the same.	Sensory
Token	Referent of type occurs in sensory range; also signifies concepts that may have no direct relation to the situation type (i.e., by wearing running shoes in the lab, a technician can signify she's a jogger, that is if you the observer know this concept). Correlated signifying tokens are conceptual traits. Tokens approximate environmental forces, given partiality of information in the sensory range. When a token occurs it becomes an intension. All non-occurring tokens belonging to its type(s) are its extensions. Tokens are either structural or operational. Structures and operations co-constitute situations/procedures.	Sensory
Theme	Set of types across different tokens. Individuates along series of concepts (configured by operators) that form possible worlds. Themes are anticipatory and guide intentional consciousness across situation types.	Metaphysical Domain
Concept	Set of tokens across different types. Orders tokens into ratios of procedural constraints (structures/operations) that form possible worlds. Through signifying tokens, concepts organize traits (objects of knowledge). Concepts are tool-like. Concepts belonging to themes are genera.	Metaphysical Domain

Situations and procedures are two sides of the same experience. Using tokens, types, concepts, and themes, we can model experience (memory, expectation, archival systems) to tractably represent the metaphysical domains of an intentional organism. Models of intentionality position the analyst at a juncture; she can localize an agent's stock of types (ontology) or extend types to conceptual themes that schematize an agent's capacity for mobilizing procedures across possible worlds of experience (epistemology). Are there languages beyond the metalanguage of conceptual themes? Given the fact that intentional consciousness can take a set of tokens, order them into types, then create further sets of types, the only limitation on language construction is how much time, energy, etc., an organism can afford to spend. Thus, the sensory range constrains intentional consciousness from drifting too far into abstraction.

At the Lab, or ‘Two ways for doing the same thing’:

Now that we have a general scheme of the methodology, it's time to localize the case. My information about GAP and A & L comes primarily from a provincial inquiry – directed by Inquiry Commissioner, Justice Dennis R. O'Connor from October 2000 to September 2001 – that attempted to thematize the Walkerton crisis into a series of preventable situations entailing procedural responsibility on the part of multiple organizations. For the rest of this section my analysis will concentrate on separate presentations given by representatives from A & L and GAP.

Robert Deakin, lab director with A & L's Ontario location, went before Commissioner O'Connor's inquiry to represent the lab and explain its procedures, especially those involved in the Walkerton crisis. Before Deakin could testify at the inquiry he had to swear an oath and designate his position within A & L's organizational structure. Deakin manages 'day to day' procedures of lab analysis but is not directly involved with administration, a separate set of procedures with their own designated manager. When Deakin entered the employment of A & L, he had to undergo an initiation at the organization's headquarters in Fort Wayne, Indiana. During his initiation, Deakin learned to conceptualize the organization's protocols and procedures. Protocol²² actualizes two overarching themes for laboratory life. 1) As a formal statement of transaction (i.e., a contract) it binds an initiate with an organization, whereby he becomes its technician, a situated agent who effectuates the organization's procedures. But to become a technician the initiate must enter the organization's domain. 2) Thus, protocol is also a binding ontology that legislates techniques by giving a general survey of structures the technician will encounter. Techniques are procedures that require

²² *The etymology is Greek: proto: original, kollon: glue.*

initiation by protocol. Without protocol, techniques remain inaccessible²³. A general survey distributes concepts of themes (general expectations, objectives) that guide procedures. For example, 'presence/absence' (P/A) is a theme that guides an A & L technician's approach to contaminants: instead of localizing strains of a particular type of contaminant, the technician scans for a class of coliforms. On the other hand, a microbiological technician has protocols that enable her to analyze contaminants by protein structure (e.g., specific coliforms like *E. coli*), which A & L technicians cannot do.

Thus Deakin became a technician of A & L. The techniques Deakin learned outline his organization's activity. A & L is a network of 'general service laboratories' that offers different types of testing for a host of international clients. Some of the organization's domains include agricultural and/or environmental situations; some of the sample structures it tests include soil, plants, manure, fertilizer, and water. As I mentioned in my introductory remarks, A & L labs actively scan their local environment using marketing agents, to develop procedures that thematically complement local organizations (their objectives, tasks and problems) and enrich the network's client base. Despite their adaptability, A & L technicians, especially lab managers like Deakin, are agronomists, technicians bound to agricultural protocols. Thus, when A & L's Ontario lab found municipal PUCs wanting ground water tests, its technicians could not simply step in and serve. At this point, the day Deakin testified (W1A00/10/18), there are no microbiologists on staff at A & L. But microbiologists manage protocols within the

²³ However, as A & L's ground water testing procedures demonstrate, there is more than one way to actualize an objective: techniques can be simulated and protocols can be avoided.

domain of micro-organic structures that inform (e.g., contaminate) situations where ground water testing becomes a necessary procedure.

Usually, when A & L encountered unfamiliar domains its technicians could not ‘access’ (e.g., microbiology), it would contract other labs whose protocols enable appropriate techniques. GAP was one such lab (in Ontario) that provided ground water testing on behalf of A & L. In this way, A & L could compensate for lacking certain techniques while coordinating services for clients based in disparate domains. This strategy, however, exposed A & L to problems of technical credibility, for if a lab relies on external organizations to perform its ‘chemical analysis’, it stops ‘acting like a lab’. As well, subcontracted labs like GAP have their own client base to develop and the techniques that A & L protocols can’t access are theirs to command. Thus, A & L had to 1) find a way to extend its ‘general lab services’ while 2) minimizing investment in unfamiliar domains (i.e., developing expensive protocols and techniques) without 3) becoming dependent on the agency of competing labs.

There are procedures available that enable a lab to perform tests in situations from unfamiliar domains, such as microbiology, without adopting their attendant protocols and techniques (e.g., tracking *E. coli* lifecycles and differentiating strains of *E. coli*). A & L took this route when dealing with Walkerton’s PUC, especially after GAP – its ‘ground water’ subcontractor – began limiting its activities to consultation in 2000. The procedures in question are pre-packaged analytical tools or ‘kits’ with built-in ontologies for identifying structures based in unfamiliar domains. Organizations that produce water testing kits aim for the ‘non-expert’ and establish a ‘do it yourself’ theme: e.g., homeowners interested in the purity of their water, land developers assessing natural

resources, hypochondriacs. A & L adopted a series of kits produced by the Hach Company. For example, here is how Hach's website presents the microbiology kits that A & L adopted:

Hach has been in the business of microbiological testing for over 20 years, with the goal of simplifying what can often prove to be a demanding area of analysis for many. All of our microbiology testing products are designed to work as complete systems, featuring ready-to-use prepared or dehydrated media and reagents, illustrated procedures, instruments, apparatus, and labware. Our portable systems include everything you need, in a sturdy field case (Hach 2001).

By 'built-in ontology' I mean a Hach kit provides concepts that are only tractable in relation to the tools and procedures it includes. Moreover, these concepts enable an analyst, in the case of water testing, to operate on microbiological situations without being guided by microbiological protocols. Built-in concepts establish tokens that simulate (i.e., reference the same correlations as) types of microbiological techniques. For example, instead of identifying *E. coli* by specific taxa, a Hach kit uses a chemical medium or broth that reacts to *E. coli* by changing colour, thus indicating the bacteria's presence/absence ratio. As such, a built-in ontology can order types of contamination along gradients of colour without necessarily establishing microbiological protocols on what the contamination is about: e.g., the strain of *E. coli* and its constituent proteins.

Despite their capacity for guiding non-experts through unfamiliar domains, pre-packaged analytical tools do not simply 'fake' technical situations. When the Ministry of Environment and GAP conducted ground water tests, they both relied on techniques similar to procedures built into Hach kits, colour coordinated indicators of contamination. To understand this capacity for simplifying situation types, we have to incorporate a model of sensory ranges into the analysis. Referential tokens occur in sensation. The

fastest way for humans to gather information is by typing events in their sensory range (referential tokens). Furthermore, a visual field of colour allows organisms to type situations (e.g., red $\equiv$ hot) and monitor ongoing differentiations of token colour gradients that signify situational variations (e.g., red $\leq$ pink $\leq$ grey $\equiv$ hot $\leq$ warm $\leq$ cool). As the colour gradients differentiate, they constrain an organism's choice of operations (e.g., red(X) $\rightarrow$ wait for X to cool)²⁴. Without necessarily understanding the complexity of X (how a heating element works), a situated agent can conceptualize traits or predicates (red, hot) that lock onto immediate referential tokens (colour gradients) within her sensory range, and guide her through disparate situations where red and hot belong to the same type. Moreover, colour traits can signify an indefinite number of situation types, structural and operational: e.g., red means hot, but it also means 'stop', lust, anger, etc. Thus colour concepts are shortcuts through complex domains, but they require correlated tokens to prevent humans from mistyping an emerging situation.

Of the Hach kits that A & L implements for its ground water testing procedures, the presence/absence test (P/A) of total coliforms is the most common: this kit also includes a subcomponent that localizes a particular coliform, *Escherichia coli* (*E. coli*). Its procedures are as follows:

- A) Upon receiving a client's water sample – being 100 ml in dose – take a 'snap cap' vial containing a 'purple broth' of MUG reagent²⁵ and pour contents into the sample. Enclose the sample and place it in an incubator at 35 degrees Celsius ($\pm$ 2 degrees).
- B) After twenty-four hours review the sample to determine presence of contaminants. If coliforms are present, the broth + sample will change from purple to yellow.

²⁴ Here the variable *X* signifies the structures that red modifies.

²⁵ MUG is a food source for *E. coli*. When *E. coli* breaks it down, it produces a chemical that fluoresces under long wave ultraviolet light.

- C) To localize the presence of *E. coli* (quantifying only its existence, not number) examine the broth + sample under long wave ultraviolet light. If the mixture fluoresces it indicates a 'positive confirmation' of *E. coli*.

The Hach procedure manual accompanying the P/A test makes a point that colour concepts establish a binary truth-value: either the mixture fluoresces or it doesn't, either coliforms are present or absent. However, in his testimony before Commissioner O'Connor, GAP's founder, microbiologist Gary Palmateer, discusses a problem involving binary truths (i.e., P/A) and natural indicators. By natural indicator I mean complex events (a chemical reaction between broth and sample, involving multiple variables) that technicians refer to when typing the binary truth-value of a test result. Thus, when we examine the microbiological event that P/A hinges upon, binary truth can become confounded by intervening variables. A microbiological concept of coliforms (including *E. coli*) involves the bacteria's ability to ferment lactose. As Palmateer explains, using the total coliform portion of P/A as an example:

Lactose is a sugar and bacteria have to be able to break down lactose to produce acid. The hydrogen ion representing acid causes the purple medium [broth] to turn a yellow. The pH inside here would be about 5.5; whereas in the initial uninoculated medium [broth] it's 7, 7.2 (W1A00/10/19: 31).

Thus the event of a colour change is also a change in the mixture's pH balance and a change in the production of acid; moreover, all three changes correlate with the bacteria's ability to 'break down lactose.' Now, this complex event does not necessarily disrupt the mutually exclusive categories of binary truth (either/or): all the variable changes refer, either to the presence or absence of coliforms. However the subcomponent of P/A, using fluorescence as a 'natural indicator' of *E. coli*, may become confounded by the bacteria's lactose production. When bacteria like coliforms such as *E. coli* ferment lactose, they

drop the mixture's pH (broth + sample), which diminishes potential fluorescence. As

Palmateer explains:

The difficulty is on occasion an E. coli produces a very weak glucuronidase reaction and seeing that fluorescence directly in this test sometimes really requires confirmation because it may not be totally clear to the technician that the fluorescence is in fact there (W1A00/10/19: 37).

The Hach P/A test elides these considerations, for they belong to a specific domain of microbiological protocols.

The Technician:

The distinction I've been drawing between GAP and A & L cuts two opposing figures of what a technician can be. A & L delivers a technician who can process information from as many disparate domains as possible. GAP concentrates on the mastery of techniques within a microbiological domain governed by refined protocols, experimental case studies, and a complex typification of micro-organic situations. The E. coli GAP identifies differentiates into strains, such as the 'lethal' O157:H7, involving correlated tokens like lactose fermentation, pH balance, and the shape of proteins found on a bacterium's flagella (tail). The A & L concept of E. coli changes purple broth yellow and fluoresces under long wave ultraviolet light.

What emerge from these conceptual distinctions are two ways technical organizations process information, and manage protocols for the communities they interface: specialization and generalization. But what is a technician? In *L'individuation psychique et collective*, Gilbert Simondon writes:

Le technicien, dans une communauté, apporte un élément neuf et irremplaçable, celui du dialogue direct avec l'objet en tant qu'il est caché ou inaccessible à l'homme de la communauté; le médecin connaît par l'extérieur du corps les mystérieuses fonctions qui s'accomplissent à l'intérieur des organes. Le devin lit dans les entrailles des victimes le sort

caché de la communauté; le prêtre est en communication avec le volonté des Dieux et peut modifier leurs décisions ou tout au moins connaître leurs arrêts et les reveller (1989: 262).

The technician actualizes a form of singular individuality: one whose protocol binds her to a domain that remains inaccessible to common members of the community (forbidden to the uninitiated). But a general survey of the community reveals that each member positions him- or herself within some kind of technical organization and offers his or her experience to others: e.g., the doctor doesn't know how to slaughter a calf, the priest can't make candles. The community is a share of techniques, a common notion (or contract) formed between agents of disparate domains. Each agent mobilizes a domain or stock of situations: some common to most sensory ranges (e.g., supper, toilet), others specific to an organization (e.g., guild, hunting party, municipality, lab). Beyond this primordial scene we find A & L destabilizing the contract between technicians.

According to A & L protocols, no domain is inaccessible if you can obtain adequate procedures. Adequation is a kind of Truth that enables subjects to control situations without plunging through the depths of meticulous reality: e.g., colour concepts operate 'just as well as' models of lactose fermentation in typing the presence/absence ratio of coliforms. A & L represents a generalized technology that skims the surface of domains in order to process information as rapidly as possibly. Conversely, GAP represents the specialized technical domain of Simondon's conception. When Gary Palmateer presents his craft before the Commission of Inquiry, he relies on figurations that distinguish his microbiological domain from A & L's general approach to 'chemical analysis'. For example, a microbiologist in Palmateer's scheme has a dialogical bond with the beings he

or she discloses. This bond imparts a mythical intercession between the technician and his or her *opponent*:

There are some examples where researchers have taken injured [coliform bacteria] cells by chlorine and by other stressors and had people ingest them, usually professors having their grad students doing the ingesting, so if you wanted the Ph.D. you downed the sauce. Now, what happened was these organisms would produce some diarrhoea and that's all. A classic one conducted by Rite Caldwell involved an organism that can cause a serious disease but it was attenuated, so it would just cause diarrhoea, and her students did develop diarrhoea (W1A00/10/19: 42).

A number of figurations emerge from this statement: 1) ingesting the organism is not merely a stage of experimental design; 2) it manifests an identification between the initiate and her *opponent* (the organism); 3) it marks a ritualistic process in which the initiate becomes an authentic microbiologist (Ph.D.s 'downed the sauce'); and 4), it canonizes the microbiologist's technical capacity for taming her opponent and modifying the micro-organism's being to suit the concerns of her community ('a serious disease was attenuated'); 5) moreover, to become a microbiologist, the initiate must experience and reproduce how the organism affects her body: symptoms of diarrhoea become marks of distinction. Initiates who actively 'seek diarrhoea' subscribe to an order of reasons that contradicts the community their techniques serve: for Walkerton residents, diarrhoea is a sign of 'contaminated water', not a professional virtue. Nevertheless, the contradiction is resolved by the service a microbiologist performs on behalf of the community. Ingesting coliform cells substantiates methods for attenuating the organism, improving upon therapies, and testing the human immune system. Thus, the technician's mark of distinction is simultaneously exclusive and inclusive of her position within the community she serves: 1) on the inside, for the initiate, it is a myth of transmission or lineage: e.g., 'only a properly trained microbiologist can handle these organisms, like in

the classic examples of Rite Caldwell'; and 2) on the outside it is a stage of experimentation that discloses new ways of being for all with a share in the community: e.g., 'how to distribute water without fear of micro-organic contamination', 'how to identify a microbiologist's labour'.

Chapter 6: Encounters of Agency:

Aspectual Prioritization and Inquiry:

Sensory fields encompass what an agent currently senses *hic et nunc*, including problematic sensations that remain unidentified or on the verge of sense; each field provides a range of sense. Aspects are modes of differentiation within sensory fields, whereby bounded events become distinguishable from unbounded processes (Verkuyl 1993). Aspectuality initiates the indexation of information within sensory fields: the differentiation of bounded events from unbounded processes prepares a sensory field for more complex semantic formations of situation types and conceptual schemes. Before an agent can recognize the type of situation she's in, for example, the face of a friend, she must be able to index sensory fields within a perspective of compositional forms (e.g., the spatiotemporality of forms: priority, succession, stability, consistency, distance, speed).

A sensory field constantly translates information from the environment (e.g., 'cold', 'invader', 'stimulus') into processes subtending an agent (e.g., body temperature, immune system, reflex) and *vice versa*. When an agent senses a change in body temperature, she or he registers the changing process by a bounded event within the environment: e.g., 'before *it* was warm, now *it's* cold'. Moreover, aspectuality may present complex processes across correlated sensory fields. For example, changes to an agent's immune system ('getting sick') encompass series of bounded events (*symptoms*: cramps, diarrhoea, 'cold sweats') across multiple stages (infection – illness – recovery) within correlated sensory fields.

Correlations offer coefficients within a sample space (registered events or tokens, calibrated to scales of frequency, magnitude and direction) that establish a range of types for conceptual domains to 'work over' (e.g., formalize goals, schemes and methods).

Each correlation is an abstract relation that the agent infers, and it cannot be located within a particular sensory field. Sensory events are discernible because of correlation: they appear at a certain *time* and express a form whose emergence can be dated, placed within a series of formal occurrences, and caused to recur. Thus, sensible forms express aspectuality: a quantity, a process, a time, and a place.

Aspects offer the calibrative framework that initially registers events and processes prior to the composition of situation types and conceptual schemes. Aspects inform reports, or rather, sensible forms ('what I see, hear, touch, taste, smell') become contents of aspects ('this time, this place') that frame a report's specific query ('what time? What place?'). Aspects support an indefinite range of appearances (whatever sensory fields can register); thus, they cannot be reduced to categories²⁶ of experience. As Verkuyl (1993) proposes, aspects maintain the compositionality of experience, i.e., the intercession between bounded events and unbounded processes, definite objects and indefinite sensations, procedures and indeterminate situations, points and fields.

The identification of total coliforms from laboratory samples with a Hach P/A test requires a specific kind of report containing at least two aspectual series: 1) total coliforms appear through significant changes within a chemical medium (aspect₁ = durative continuity of medium); 2) if the medium turns yellow, then coliforms are considered a uniform entity (i.e., total) bound to the present aspect (aspect₂ = terminative: 'when purple ends, coliforms begin'). However, this entity isolated within the lab does not necessarily entail a corresponding presence within the water system it was sampled from; a second water sample has to be taken to ensure that contaminants within the lab

²⁶ Vendler (1957) proposed a quadripartition of aspects: states, activities (unbounded processes), accomplishments (bounded processes) and achievements (point events). As Verkuyl (1993: 3 – 4) indicates, Vendler's categorization reduces aspectuality to situation types.

are not influencing results. If the second sample also turns the medium yellow, then the process has authenticated (and bound) the entity's status ('coliforms!') within the sampled water distribution system.

Thus, aspects may be gradually transposed from one medium to another, from the aspectual series within the isolated laboratory system to the general aspect of the water distribution system it samples. The distribution system comprises general aspects (e.g., procedural schedules, plans of water flows, rates of chlorination, water consumption patterns) because it encompasses too much information for it to be contained within a single agent's sensory range. General aspects frame the system within an order of reasons, along a goal-oriented scheme of possible worlds that correlate with specific procedural methods by anticipating encounters.

An agent drinking a glass of tap water may use that situation as a token for what the distribution system is expected to do, but most agents rarely take the time to consider how water flows through an underground pipeline, how chlorinators inject treatment solutions in the water, how decaying matter infiltrates the system, how the municipality hires the PUC Manager, how the PUC Manager learned his profession, and so forth. Thus, an agent must stick to general aspects when filing reports on the system, otherwise she would be appending detail upon detail (type upon type) *ad infinitum* along an extensive series of situated tokens. General aspects secure the integrity of a domain's goal-orientation.

An archive of such descriptions would become an endless jumble of encounters and procedures unsuitable for configuring a causal network. As a result, agencies like the MOE that survey the system must carefully balance their consideration of its many

aspects. For example, overgeneralization causes a loss of incidents (‘institutional memory’) within the system of reportage, as with the ten-year gap (1980 – 1990) where no verifiable tokens of Walkerton PUC activity exist in MOE files (O’Connor 2002a: 116).

Agents must keep track of a system’s process in order to verify aspectual changes (e.g., over a span of ten years, how many times did the PUC register the presence of contaminants?) If questions about formal recurrence cannot be answered, the agency will be unable to schematize the system’s general organization: there will be no general pattern of activity and no sense of goal-orientation. In this non-standard world an MOE officer’s reports are merely shorthand tokens of his or her unverifiable situated information process. To communicate general organizational trends, inspectors require schemes and systems of evaluation that are verifiable across groups of agents, alongside an order of reasons that conditions understanding within a game of coordination.

Organizational memory:

In its general form, the archive of inquiry is cinematic: rows of files are connected along series of signifying paths (e.g., file numbers, sectors of activity, indexes); but it is the movement from one file to another across the series that generates meaningful relations of knowledge (a causal network of inferences, a history of periodic activity). Before Commissioner O’Connor can inaugurate the Walkerton inquiry, he requires a massive information process to organize the statements of multiple disputants, each representing disparate perspectives of the crisis and offering evidence substantiated from their own particular situations: documents (e.g., of testimony, reports, correspondence, policy, evidence) from each of the disputants and witnesses become anchor points for verifying

statements of intent, purpose, qualification, identity, and so forth; documents even verify the spatiotemporal coordinates of witnesses during key periods of the crisis's causal history.

The Commission collects thousands of documents from various sources: e.g., private citizens, Walkerton PUC, Municipality of Brockton, A&L Canada Laboratories and GAP EnviroMicrobial Services. "By far the greatest number of documents collected, perhaps as many as one million, came from the provincial government" (O'Connor 2002a: 483). The Commission registers government documents from six provincial ministries: the Ontario Clean Water Agency, Management Board Secretariat, Cabinet Office, and the Premier's Office. Of the total, the Commission scans 200,000 government documents into a database.

Between June 30, 2000 and January 17, 2001, the Commission conducted 17 'Freedom of Information' document requests to the provincial government to retrieve sufficient information. The three lead Commission counsel organized the formal interrogation process, directed document reviews, summarized witness interviews, and set the order of evidence. While gathering information about the events leading up to Walkerton's crisis, the Commission employed two RCMP investigators to collect witness statements, prepare evidence, and assist in file management. Reviewing documents entailed scanning them into the database and producing CD-ROMs that were provided to disputants in exchange for "a signed undertaking regarding confidentiality" (O'Connor 2002a: 483). Commission counsel also transmitted 'regular statements' ('updates') to all disputants, notifying them of 'anticipated evidence from upcoming witnesses' by about a week in advance (O'Connor 2002a: 483). Ultimately, the process translates into a formal

system of inference punctuated by disclosures of evidence that will be used as a guide through points of reference during the Public Inquiry's official period of interrogations, when oaths of verity are sworn before witnesses. O'Connor writes (2002a: 484):

A total of 447 exhibits, containing more than 3,000 documents, were entered into evidence at the hearings in Part 1. There were 95 hearing days over nine months, generating 21,686 pages of transcripts. In all, we heard from 114 witnesses. Statistics aside, it was an enormous task to review and classify the documents, to identify and interview witnesses, and to digest and organize the relevant information so as to put it into evidence in a coherent way. Commission counsel, staff, the parties, and their counsel and staff spent countless hours ensuring that this process worked. As a result, with a few minor exceptions, the hearings proceeded on schedule.

An MOE district or area office's filing system is much less complex than the Commission's but aspires to an analogous form of information retrieval. When searching for documents of past field inspections, an inspector opens a drawer and leafs through the assorted scraps of field notes, maps, diagrams of operations, copies of PUC Certificates of Approval and Permits to Take Water, contact lists, copies of orders issued against a client, letters of correspondence, and miscellaneous information from exogenous groups: e.g., reports from an engineering survey, a pamphlet from the lab that tests the PUC's water samples, CAEAL²⁷ guides about lab protocols and methods of 'good practice' from the Ontario Clean Water Agency, Regional Municipal Association, and others. Each file gathers a series of cases, ideally in chronological order or some other transitive formation, to facilitate causal conjecture; each case involves an institutional entity and the organization it manages under the MOE's 'oversight' (O'Connor 2002a: 271). The entity is municipal: the Public Utilities Commission, a corporation of Walkerton's municipal council whose Manager and operators are empowered by elected council

²⁷ *Canadian Association for Environmental Analytical Laboratories works in conjunction with the Standards Council of Canada (CAEAL 2000)*

members to manage the daily affairs and ensure the safety of the municipality's waterworks.

For the Commission (*in actio*) and the MOE office (*in potentia*), names scattered about the file catalogue an intricate web of tags, exchanges, estimates, beliefs, requests, consultations, commands, clarifications, threats, promises, ruses, concerns, and so forth (e.g., 'Dear Minister, I am outraged... that the town's water supply... I will be contacting the media'). The MOE office is only a potential network of meaningful connections because staff responsible for Walkerton rarely set a path through their archive: files are not historically linked, documents trace inconsistent causal networks, and evidence is left unsubstantiated. For example, a November 1978 meeting between MOE and PUC staff regarding Well 5's exposure to contaminants is forgotten during subsequent MOE inspections (O'Connor 2002b: 29). As recorded in the filed minutes of that 1978 meeting, PUC operators agreed to monitor daily chlorine residuals and record the results on daily operating sheets (O'Connor 2002a: 194). Twenty years later, an MOE inspection registers PUC operators failing to monitor daily residuals and even making false entries in their daily operating sheets (2002a: 284); Well 5 is also underchlorinated but, since MOE district officers fail to review past documents, or treat the PUC as a historical entity with its own activity apart from the MOE's conformance plans, the well's problems are overlooked and inadequate PUC chlorination practices are not framed within a 20 year history of nonconformance.

The goal of the archive is a retrieval system that can substantiate (or at least represent) any possible situation from an inspector's memory, such as recalling promises made by PUC Managers, a history of PUC contraventions, a history of the town's

consumption patterns, an organizational chart of the client's current configuration that features the duties and capacities of its operators, their system of authorization and chain of command. For example, the Commission is able to determine the following scenario by correlating MOE and PUC files: 'where was Stan Koebel when the PUC first considered building Well 5 in the late 1970s? Retrieved PUC documents from Inquiry files show he was a labourer and probably had no idea that an engineer's report considered the well unsafe....'

However, the goal of perfect recall is an impossible task. Without an editor the archive can barely sustain a consistent set of meaningful relations across a series of files, let alone the achievement of cinematic status. Within the MOE archive, multiple officers, 'doing their own thing', alter a file's internal consistency; they each take part in monitoring a client: e.g., Environmental Officers, S.W.I.P.²⁸ inspectors, abatement officers, Managers, Supervisors, provincial specialists, engineers. Each officer has a particular way of archiving files, coding documents, evaluating reports, and filtering prescient information from noise: e.g., signed faxes from a PUC Manager that promise compliance *versus* carbon copies of standard inspection forms that 'clutter up' the file.

As a result, there are at least two disparate narratives leaving a trace through every file, two series of cases, and two inquiries. Of course, each partial inquiry and its organizational memory (e.g., within a corner cabinet of the archive under a pile of inspection forms and empty folders) are cultivated under legislated ministerial conditions. In 1992, the government of Ontario began standardizing its information retrieval system (Corporate Management Directives 1992). Every ministry office from the MOE to the Ministry of Housing *should* use standard folders with standard tags within standard

²⁸ *Sewage and Water Inspection Program*

cabinets; employ a records manager who monitors and edits the information process (in terms of how individual inspectors code documents, retrieve files, treat the file-room); and destroy files on an annual cycle (Archives of Ontario 2000).

Of course, disparities occur within an organization. The Owen Sound MOE office that surveys Walkerton did not employ a records manager, nor did district officers and administrators coordinate an archival management system. 'not even, as per management specifications...', to historicize the lifespan and causal network of a particular entity (whether a PUC, an asbestos mine, a gas station, or a kindergarten). Thus, a client often passes faceless within the archive: e.g., some PUC operators have drinking problems, their Manager is officially unqualified, key operators don't believe in chlorination....

The MOE became an entity in 1972; soon after, it began documenting the inquiries of regionally distributed inspectors. Thus, a graph of Ontario's environmental development begins to draw itself through the pattern of inspections, correspondences, orders, suggestions, requests, petitions, pamphlets, adverts, and so forth. The archive presents industrial movement: from 1970s installations of copper piping in municipal waterworks and legislated chlorination requirements ('The water is contaminated!'), to the beginning privatization of hydroelectricity in 2000; a figure of the metastable environment (its landscape) emerges from the trace of encounters underlying each case – forests become paper mills, lakes become factories, 'the air becomes polluted', 'water becomes contaminated'. Thus, Ministry representatives send statements to the public, such as 'MOE studies demonstrate ground water is safe for public consumption...zero tolerance for contaminants'.

As industry increases and complicates into multi-agential organizations (e.g., PUCs + commercial labs + engineering firms), MOE officers come to rely on pre-processed information from the archives of clients. For example, the A & L network manages a procedural archive that profiles various industrial activities across Ontario, listing the tests clients procured, the procedures and kits they required, soil samples from farms, and water samples from PUCs. However, due to its client confidentiality protocol, A & L actively ‘forgets’ test results and does not track a history of adverse samples for each client (W1A00/10/18: 86). Thus, when samples from Walkerton’s PUC test positive for the presence of *E. coli*, A & L communicated this result to its client representative, PUC Manager Stan Koebel, and no one else.

In Ontario there are legislative ambiguities that disrupt the protocols controlling A & L’s organizational memory. Ontario’s Drinking Water Objectives (1994) require (but do not legally bind) labs to notify the MOE upon registering an alarming test result, such as a water sample indicating a situation that endangers public life. However, the Standards Council of Canada, a federal authority, requires labs to develop client confidentiality protocols in order to protect the information of clients (PALCAN 2001: 50). A translation from A & L’s archive to MOE district offices affords MOE officers a chance to track adverse PUC samples as they emerge. Unfortunately, this scheme becomes compromised by the agencies’ actual game of information exchange: A & L cannot risk losing its lab accreditation under the Standards Council, otherwise it would lose clients due to inauthenticity.

Ontario’s Drinking Water Objectives (ODWOs) are statements in the form of desiderata, ‘best practices’ that propose a correlated equilibrium in the form of ‘good

drinking water' for all agents involved: 1) if labs report adverse test results to the MOE, 2) inspector's will know how PUC operations are handling contaminants, and 3) won't have to rely on the statements of possibly negligent or incompetent PUC operators for information about rates of contamination, especially when 4) a delay between the time lab technicians confirm contaminated water samples and the time a PUC operator locates points of contamination prolongs the public's exposure to disease and insecurity.

Propositions 1 to 4 are merely possible worlds, despite guiding forms of activity in terms of ideal expectation; as 'best practices', they are not fixed by legally binding statements or successfully coerced by threats.

Thus, the translation of information from the lab to MOE officers is uncertain: e.g., the manager of A & L knows about 'Ontario's Drinking Water Objectives', and understands their principle 'to secure drinking water in Ontario' (W1A00/10/18); but he also belongs to a legally binding contract with the company that employs him. If A & L policies, which he helped formulate, contradict merely 'ideal objectives', the outcome favours statements belonging to (procedurally embedded) contractual policy.

Nevertheless, an MOE officer could call the lab after hearing about Walkerton's 'boil water advisory', and question the manager about samples that 'may have been out of the ordinary'. If the manager cares about the lab's 'public image' he will cooperate and provide information; after all, a commercial lab cannot afford to lose public support from a 'tainted water scandal'. But officers expect the lab's manager to expect this possible outcome, 'a bad reputation in the community'; so they wait for labs to contact them.

Meanwhile, A & L holds to its policy because it expects the PUC to hold to its legislated obligation under Ontario's Water Resources Act (1990). Thus, by the time

information about potential contaminants reaches MOE officers by way of the local Health Unit's 'boil water advisory', the public has already been significantly exposed; moreover, this sign of contamination ('boil water advisory' on the radio) mobilizes spectators and sways 'public opinion' regardless of whether a bacterial colony is actually influencing the water distribution system – that is to say, rumour is afoot.

Thus, expectations can stabilize equilibria where all players remain exposed to danger: e.g., the MOE inspector is uncertain of the PUC Manager but he expects the lab to cooperate; the lab manager is uncertain of the MOE (its regulations and objectives) but expects the PUC to comply with provincial legislation; the PUC Manager is uncertain of the MOE (after all, inspectors hardly visit) but expects the lab to notify 'the proper authorities'.

Agency:

Analysts intent on tracking tokens of agency to model individual agents, their tasks, and coordinated activities require a composite scheme of physical and cultural²⁹ concepts.

Models of individual agents form around the correlation of three kinds of tokens that signify how an agent physically appears: A) in a given sensory range, B) across a series of encounters, or C) within a bounded time frame of periodic cycles. Tokens of

²⁹ I use cultural instead of metaphysical because culture comprises a 2nd order metaphysics, e.g., pedagogical schemes (instructor initiate) that condition 1st order metaphysical typifications of 'the world', 'the state of things', 'the way it is', etc. In other words, 1st order metaphysics entails ontological models, while 2nd order metaphysics entails desiderata, 'what ought to be' or 'could be'. Cultures condition by desideration, e.g., initiating an agent by disclosing her lack of certain formalisms, grades, values, etc. The initiate has potential but requires instruction, training, guidance, 'role models', etc. Cultural agents (e.g., instructors, teachers, parents, disciples, peers, etc.) force initiates to recognize that 'they don't know how the world is' but, if they acknowledge their lack, they may enter a pedagogical process that effectuates the transmission of ontological conditions (e.g., authentication: what is required to 'know the world', and prove to others that 'you know'). Thus, every organization of coordinated agents relies on some form of enculturation or authorization to transmit operating conditions, common referents, command structures, reasonable expressions, goals, etc. Following this abstract order, the critique and or enforcement of cultural transmission (e.g., correct ontological interpretations versus taboos, vices, etc.) reside in a 3rd order metaphysics, whose model is epistemology.

appearance manifest the following three types: 1) *Proportions* that substantiate an agent within particular or correlated sensory ranges (e.g., taste³⁰, olfactory scent, tactile texture or audiovisual scene). Proportionality depends on a normal configuration of parts that form a uniformly identifiable whole: extension/size, combination/shape, repetition/frequency. Because proportionality defines how we substantiate appearance, when a normally recognizable agent appears 'out of proportion' we become suspicious of potential illusions, deceptions, and errors within our sensory range. Proportionality entails consistency, the perdurability of forms in the midst of chaos. However, verifiable proportional shifts, that is, emergent mutations that become consistent across situations, force us to reassess our substantiation of a given agent (e.g., puberty: 'a child becomes an adult'). 2) *Accidental* forms are 'surface effects' or bounded events (e.g., before contamination/after contamination) that alter signs of an agent's appearance without necessarily obscuring or redistributing substantial proportions. For example, in occidental medicine a 'sick child' does not substantially alter into a nonhuman form (e.g., spirit possession); doctors consider her the accidental form of a 'child who got sick from contaminated water' and know her altered state will return to normal when the infection clears.

A list of accidents would include symptoms (vomiting, cramps), expressions 'given off' (Goffman 1959: 73), 'bodily functions' (defecation³¹) and affectivity ('I'm

³⁰ The paired examples signify a sensory process and the formal structure it supports: olfactory scent. For most humans, taste can be integrated into the olfactory. Because of its indistinctiveness, taste becomes metaphorical of sense in general: e.g., 'she has good taste', and indicates our ability to control sensibility by evaluation, e.g., good/bad, tasteful/tasteless, enticing/revolting.

³¹ Defecation is a ritualized function for many cultures (e.g., separate genders, obscure the activity, cleanse the body after elimination, fetishism 'white, cottony soft toilet paper'). The ritual often serves to dissuade our attention from the actual process of 'shitting', which acquires the negative value of an accidental form (e.g., Latin *copro* = filth). This rule is not absolute however: coprophiliacs who adopt 'shit' in their sexual

outraged!'). The difference between substance and accident is a point of decision: the categories are ontological tools that assist us in clarifying our interpretation of appearance. A bulimic teenager who purposely, albeit compulsively, 'sticks fingers down his throat to vomit' substantiates a procedural structure³² (e.g., 'I puke when I'm full') that a child infected by *E. coli* O157:H7 cannot adequately conceive (e.g., 'we don't normally *wish* for disease'). The former is a substantial part of bulimia's definition and describes bulimics in general; the latter is not a permanent definition of the child, nor is it a substantial part of *E. coli*, but is merely symptomatic of the child's accidental encounter or contact with *E. coli*, resulting in infection.

Accidents are identifiable, but only as *haecceities* (Kaplan 1975; Deleuze & Guattari 1987: 262) that qualify a particular encounter or episode of contact between substances: '*this* infection began in 2000'. A substance is defined by its capacity for sustaining repeated encounters³³ (e.g., rocks, light, water, bacterial colony); it signifies a consistent substratum or field of encounters in which accidents inhere.

Thus accidents appear as expressions of a contingent encounter between a substance and an external cause, a partially identified substance: e.g., 'germs (indeterminate cause) infect the body (substance) which produces symptoms (accidental forms) in response'. Of interest are accidents whose duration is indeterminate: e.g., symptoms of *E. coli* O157:H7 infection can reappear years after a patient's first contact with the bacteria. Agents who live with ongoing symptoms often substantiate the accident as part of their own procedural identity: e.g., AIDS patients become *activists*

practices and scatologists who analyze 'feces' into objective categories, actively substantiate forms of excrement that most westerners would rather forget.

³² Procedures entail typification, repetition and practice as well as reconditioning, disruption, and therapy (e.g., 'bulimia is a disease', 'stop vomiting').

³³ Here encounter entails physically 'bumping into each other' without necessarily generating appearances within a sensory range.

against pharmaceutical companies; infected Walkerton residents become *victims* in a class action suit. Substantiation reduces uncertainty by incorporating accidents into a daily regimen that stabilizes ongoing symptoms (e.g., ‘take your medication’, ‘fight for your rights’), and organizes affects (e.g., therapeutic procedures convert fear into *resignation*, a lawsuit converts loss into potential profit).

The final type of appearance is 3) technicity or how an agent modifies substance. By observing how an agent operates on the structures around her, we learn how she substantiates events and prevents accidents. The knowledge we learn invokes a two-fold pragmatic principle: 1) human activity communicates reason by causing an effect (actualization); 2) human reason communicates activity by effectuating a cause (meaningful model). While observing an agent’s activity we extract performative tokens to substantiate her *reasoning* (expectations, truth-procedures, plausible inferences) and *understanding* (‘common sense’, targets, habits, affects). Performative tokens inform competence matrices that analysts configure to learn about an agent’s target selection, priorities, achievements, ideals and general goals (success *versus* failure, efficient activity *versus* ‘a waste of time’, concentrated effort *versus* inattention).

From tokens of general appearance (‘how she appears and what she appears to be doing’) we summarize an agent’s activity across possible worlds. A fragment of these worlds attends our judgement of an agent’s intentions and informs our interpretation of what she considers typical, procedural, ordinary, necessary or contingent, right or wrong. For example, if an agent habitually repeats a specific operation like ‘hand washing’ and we assume she is a doctor (e.g., we recognize her medical degree, that she treats patients and charges OHIP) then her procedure likely signifies or ‘fits into’ a hygienic work ethic;

but if we diagnose the agent as schizophrenic (e.g., she was institutionalized, is medicated, and delivers incoherent statements), we will more likely interpret her hand washing procedure as an 'obsessive-compulsive' disorder. Thus, we compare performative tokens across sets of agents within an organization, range of situations, and so forth, to evaluate different context-dependent kinds of optimality, reliability, validity, judgement and taste, thematic reasoning, and goal-orientation.

Performative tokens correlate an agent's appearance with our model of her information process; they signify 1) expected conditions that we presume (e.g., 'she's trying to get out' or 'she wants my attention') and 2) situated constraints that we observe (e.g., 'the agent is banging on a door'). Unless illusions are involved, observed constraints are relatively unambiguous and depend on procedural typifications within a sensory range ('I know what I see', matters of fact, mundane affairs, ordinary situations). On the other hand, our expectations are disambiguated by degree, according to criteria of *plausible inference* ('this situation reminds me of concept X'), *sufficient evidence* ('how similar is the situation to other tokens of concept X?'), and *probable occurrence* ('what future events and possible operations likely correspond with concept X, given the situation at hand?'). There is often more than one reasonable interpretation and plausible explanation for any given activity, but expected likelihood is an efficient way of economizing our knowledge (of agents, events, and situations) when truth has not been fully substantiated or procedurally instituted (e.g., as an inspector: 'I've been trained and authorized³⁴ to discover the cause of specific accidents').

³⁴ *Institution entails a culture of exchange from one agent to another (e.g., instructor initiate), that not only transmits substantial knowledge along a historical network but authorizes initiates to become instructors and enforcers of instituted forms that preserve the line of transmission, i.e., laws, conventions, rituals, style, etc.*

Through an agent's technical appearance our model positions performative tokens along a network of meaningful relations between sensory events (signs) of substances and accidents. A primitive network effectuates causal pathways across typical situations but may become increasingly generalized as we assess the evaluative criteria, frames of reference, and biases that structure our causal conjecture of possible worlds. Thus, we can 'zoom out' (Devlin & Rosenberg 1996) from the detail of a performance evaluation to assess the context dependence of our evaluative criteria, e.g., with frame analysis (cf. Bateson 1972, Goffman 1974, Kahneman & Tversky 1984); or 'zoom out' even further and model the heuristic principles (Tversky & Kahneman 1974) that condition our initial categorization of activity (e.g., 'do we compare a uniform agent to canonical examples, or track evidence against base rate frequencies of typical events?').

Thus, every level of significant relations within the network distributes positions that cluster into neighbourhoods of overlapping ontological categorizations: what kind of being is this **X** whose neighbours are **Y** and **Z**? Given our knowledge of **Y** and **Z** we make assumptions about **X**, the 'company they keep'. When we 'zoom in', the network increases in density as positions become correlated with situated constraints featured in our sensory range (such that our model becomes a catalogue of observations, affects and microscopic details). 'Zooming out', we begin to lose track of situated constraints as positions become increasingly influenced by conditions of general themes and ideals. At general levels, we begin answering questions about an agent's selfhood (e.g., status, work ethic, goal-orientation, affiliation) by drawing on the propositions (schemes and methods) that merely guided our previous typification of the agent's appearance. In such experimental situations, we may likely speak a language understood by the agent; thus we

analyze 1) her utterances or transmissions (signal/noise ratios) for 2) translatable statements (e.g., expressions, commands, instructions, stories, recollections) and 3) replicable propositions (e.g., expectations, causal schemes, maps, strategies).

Selfhood implies a specific array of operations that express *reflexive models* ('how I feel, what I do, why I'm here'), and *dialogical schemes* (self/other, disputant/respondent, friend/enemy, utility/penalty, yes/no). In this sense the agent commands a point of exchange with others; others propose plausible strategies and the agent decides whether to accept or deny their validity. Values are exchanged between self and other. One agent discloses his position to another by the way he bargains for goods (cheapskate), breaches topics (exaggerates) and handles information (gossips). However, this agent's disclosure hinges upon his previous interpretation of another's position and set of values (e.g., perspective, measurements, priorities, schedule, schemes, goal).

Thus, values entail an exchange of statements where at least one agent maintains a dialogical scheme of self/other (e.g., a technician reads statements transmitted by a 'chlorine meter' to verify information and 'check for errors'). A one sided dialogical scheme, reflecting the observed without including the observer or *vice versa*, does not necessarily condition our sociological perspective. We may turn our tacit typification process, how we code the activity of others, into an analyzable and reconfigurable structure; thus, we 'declare ourselves' and expose our information process by formalizing implicit evaluative criteria (types) into statements of intentions and propositions.

For example, 'my model examines how agents ascribe status or position within a particular organization of activity.' It conceptualizes status from the formally recurring

way agents interact with others who belong to their organization. Each formally recurring interaction correlates with specific denominations of agents (e.g., managers, employees, friends, anonymous clients, 'that asshole'), such that we can predict success rates of transmitted information from the number of times an agent's statements match the status of another and effectuate an efficient cause: A. proposes 'I want X'; A. transmits a message, 'I want X' when B. is around; B. interprets the statement³⁵ and decides upon a proposition 'A. wants X'; B. gives X to A. or denies the request if its proposition is insufficient or meaningless, and so on. Deciding upon a proposition entails finding out what a statement means (e.g., PUC Manager: 'What does the MOE want me to do?') Proposing a statement entails an agent who identifies a concern (e.g., point of decision, tolerance threshold, agitation, fear) and acts on it by either expressing a statement 'Help!' or conducting interpretable procedures, as in, 'I'll do it myself' (without necessarily 'thinking aloud' or formalizing activity).

Thus, selfhood conceptualizes a pragmatic model of agency. Moreover, pragmatism manifests a reflexive model of subjectivity that assumes that in specific situations an agent knows what form or *persona* she has to take in order to 'express and possibly acquire what she wants' (if methods are sufficient). As a result, we must assume that an agent conceptualizes her situated cognition into propositional models, beliefs, methods, etc., and has a capacity to actively seek 'a best fit' or sufficient reason for her actions, without necessarily avoiding misunderstandings, cross-purposes, or dishonesty

³⁵ Messages are subsets of statements that keep consistent through syntactical relations embedded in a transmission (e.g., alphabet, graphics, 'write from left to right', 'take a breath at each period', 'audiences prefer stories with conflict and statements of emotion'). However, messages do not capture all the relations conveyed by a statement. Audiences observe facial expressions, posture, tone, complexion, costume, etc. Agents who are successful actors or orators may organize multiple facets of expression (e.g., 'smile for the camera', 'look them straight in the eyes') but will never control every interlocutor's interpretation. As such, an actor may not even have propositions that align with the thoughts of his interlocutors and observers.

on the part of interlocutors. Propositions anticipate positions and offer evaluations, maps, and genealogies of their relations; positions inform propositions by offering agents a place for gathering and transmitting statements. Thus, a causal network of situated constraints locates the agent by identifying subjects and substances (*viz.* maps, models, surveys, etc.) that inform and are conditioned by an agent's expectations (e.g., MOE officer: 'What I'm *looking* for is compliance') and goal-orientation (e.g., achieving one's targeted quantity of MOE inspections).

Deliberate inquiry requires a catalogue of agents to keep track of witnesses and their statements. Under the Public Inquiries Act of Ontario, a commissioner may order agents to testify before his or her inquiry (R.S.O. 1990, c. P-41, s. 7(1)). However, there are concessions embedded in Public Inquiry through its ritual procedures (e.g., 'how to address a commission'), informal rules (e.g., 'what the judge prefers'), and formal laws (e.g., a commissioner cannot determine guilt); thus, a potential witness may avoid testifying without incurring penalty by falling within an 'accidental category of contingent exceptions' that is loosely structured around the commissioner's preference: MOE District Supervisor Phil Bye 'has pneumonia', which pushes his testimony back by almost a month (W1A00/10/25); while testifying, MOE officer Don Hamilton stands periodically (against the ritual of law) 'to stretch an aching sciatica' (W1A00/11/07); retired MOE District Manager Willard Page has a death in the family and cancels an entire day of inquiry (W1A00/10/23); GAP witness Gary Palmateer has 'car trouble' and arrives late, only to be gently teased by counsel (W1A00/10/23: 11). However, witnesses hindered by accidents are not 'off the hook': the commissioner and his agents (e.g., registrar, counsel) merely defer them to a later round of questioning.

Thus, the entire schedule of a Public Inquiry may shift around at any given point; but once the commissioner chooses an agent for testimony, that witness becomes a source of evidence under law (R.S.O. 1990, c. P-14, s. 8). Agents of inquiry track each witness by their appearance, the kinds of documents they present, the statements they transmit, and explanations they propose. Witnesses are also correlated with expected propositions they fail to extend ('he didn't explain why he falsified data'), statements they fail to make ('he didn't apologize'), and modes of expression they fail to observe ('he sounded unemotional').

For example, Commission counsel generates the following propositions in advance of formally questioning 1) 'Frank Koebel', who they connect with: 2) Older brother of Stanley Koebel; 3) a PUC labourer since he was 17 years old; 4) hired on owing to the influence of his municipally employed father; 5) uneducated in microbiology, civil engineering, or the applications of water treatment; 6) improvised learning, by doing his trade and observing veteran employees; 7) 'grandfathered' into the position of PUC operator as his younger brother becomes Manager; 8) qualifications do not meet provincial requirements to become a PUC operator; 9) did not adequately understand the effects of chlorination, and believed it was a mere aesthetic application with no disinfecting capacity; 10) maintained improper operating practices, e.g., inadequate chlorination; 11) kept beer in the PUC fridge; 12) alcohol abuse; 13) his brother, the PUC Manager sent him home early because 'he was drunk'; 14) eleven year history of hypertension and on medication; 15) borderline diabetic; 16) suffered two heart attacks in 1997 and 1998; 17) his brother the PUC Manager bans alcohol from the premises after Frank's first attack; 18) a convalescent at the Homewood Institute in

Guelph after his second attack; 19) during the tragedy of 2000, he attends a crisis counsellor; 20) on antidepressant sedatives; 21) suffered chest pains while watching Mayor Thomson's testimony during the inquiry (reconstructed from W1A00/12/06: 103 – 106; O'Connor 2002: 208 – 209).

Each statement signifies a binary proposition: 1st order concepts that model physical situations (e.g., sense, effect, aspect – bounded event/ongoing process, structure/operation, affect) connect with 2nd order concepts that model metaphysical schemes (e.g., meaning, causal conjecture, intent, habit, belief, pedagogy/culture, privilege, class, morality). Each of these binary propositions place 'Frank Koebel' within Commission counsel's causal network of Walkerton's PUC: e.g., MOE³⁶ $\models$ PUC $\models$ water distribution. They also configure an overview of the situations where Koebel can be located, his personal habits, and daily PUC operations. This double placement of the subject entails 1) physical concepts that identify Koebel's appearance (across a generic temporal series, e.g., 24-hour schedule) and 2) metaphysical concepts that relate him to a causal network's modal distribution of necessary and contingent situations.

As Koebel's testimony confirms Commission counsel's statements, it also becomes integrated with the statements of other witnesses and forms of documented evidence (e.g., copies of MOE files, of PUC meetings). But Koebel's testimony does not satisfy all the other attorneys; they rephrase Commission questions, argue about semantics, challenge his statements, and request further explanations for what he previously states. Thus, the commission of inquiry forms an adjustable multi-layered

³⁶ The symbol $\models$ signifies a logical consequence: e.g., PUC activity is verifiable within the model determined by MOE inspections and is therefore a (truth-procedural) logical consequence of the model. *Ceteris paribus*, a verifiable water distribution system is a logical consequence of the model constructed by PUC operators. Ontario's Water Resources Act hinges upon the transitivity of these formal relations: e.g., the MOE should be able to verify water distribution from its position in the network.

causal network of partial perspectives, cross-purposes, missed opportunities, and merely plausible situations: e.g., ‘How MOE officers conducted inspections *versus* how they should have conducted them’. Another example would be how the Koebel brothers falsified chlorination data submitted to the MOE *versus* all the other warning signs the brothers left that should have alerted MOE officers. In diagnostic fashion, Commissioner O’Connor weighs these counterfactual situations of causality and determines which is a more important variable in the Walkerton Crisis. If MOE district officers followed up on disclosures of adverse sampling results, *if* they followed up on the 1998 inspection that disclosed improperly trained PUC operators and inadequate chlorine residuals, *then* the PUC’s non-conformance would *most likely* have been curtailed, and the Walkerton Crisis would *mostly likely* ‘have been prevented’ (O’Connor 2000b: 30).

Commissioner O’Connor must judge multiple series of counterfactual situations that become enmeshed in disparate and disputatious conjectures of causality. Moreover, every attorney and witness states his or her own propositions about 1) ‘what happened’ in 2) ‘such and such a place’ to 3) ‘so and so’ during the crisis. Proposition 1 is like a path that runs through 2 and 3 and establishes a local neighbourhood within the enunciator’s causal network. The Commissioner must survey a portion of each of these neighbourhoods if he wants to build a plausible model of what most likely happened at Walkerton. Partially integrating neighbourhoods from disparate causal schemes also affords the Commissioner a point of intercession between multiple perspectives. From this vantage point, he diagnoses how misunderstandings and cross-purposes between coordinated agents contribute to weakening Walkerton’s water distribution system; but he also summarizes the counter-measures of each enunciator’s causal network in order to

build recommendations for future practice (e.g., 'what should have been done to prevent the crisis').

In this final sense, the Commissioner of Public Inquiry works like a Chief Coroner. The Chief Coroner of Ontario 'speaks for victims' (those who cannot speak; Lyotard 1983: 24), and investigates a death or public crisis on behalf of Ontario citizens, especially the injured residents (and dead) of Walkerton who can no longer afford to trust Provincial statutes. Thus, during the Walkerton Inquiry, the Chief Coroner decides to integrate his investigation with Commissioner O'Connor's proceedings.

The Coroner's office undertakes a probabilistic causal analysis to determine who or what contributed to a particular individual's death or collective crisis. As in a Public Inquiry, this causal analysis must take into account the partial information process of disparately situated agents. It cannot hold agents responsible for information that was unavailable, no matter how causally significant, prior to the event of a crisis or death. Thus, the Coroner's office attempts to model a situated agent's ability to choose (her will), given the partial information available to her at specific points of time (framed by an agent's organizational capacity 'at the time'). As counsel for the Chief Coroner, Rochelle Fox advises in her submission to Commissioner O'Connor (W1B01/08/27:17):

It's the experience of our clients, the Chief Coroner and the Office of the Chief Coroner, that tragedies and public health and safety concerns do not repeat themselves in an exact duplication. A certain combination of factors, which is present in one event, may differ slightly in another event. It is our submission that you must not only ask what was the standard policy or practice at the time decisions, actions or inactions occurred, but also whether that decision to act or a failure to act was reasonably prudent given the inherent or implicit nature of that particular individual's or that particular entity's role or mandate.

However, the probabilistic scheme employed by the Coroner's Office does not capture the entire order of reasons behind an enunciator's mobilization of a causal network. The possible distribution of paths through each attorney and each witness's set of neighbourhoods effectuates a plan or reason for placing statements in one order as opposed to another, blaming one agent more than another, omitting some observations instead of others, relying on certain variables against others, etc. There is a reason why Commission counsel interrogates PUC Commissioners before PUC Manager Stan Koebel: 1) start with a general order of reasons behind PUC activity (e.g., budgetary concerns, annual goals, municipal politics, development plans); 2) find out how the Commissioners coded PUC operations (e.g., no knowledge of adverse water samples); then 3) work your way down to the situated PUC operators and their Manager: compare degrading operating procedures with the PUC's fiduciary condition, or compare what Koebel told Commissioners during meetings (e.g., no mention of Well 5's problems) with records of his actual performance (e.g., ineffective chlorination and inadequate bacteriological concerns at Well 5) (W1A00/11/16: 33 – 34).

Moreover, the very structure of Public Inquiry mobilizes a tripartite general plan that frames specific interrogation strategies and neighbourhoods of causally connected witnesses: Part 1A of the Walkerton Inquiry concentrates on an interrogative process of disputation, to disclose the systemic degradation of Walkerton's ground water distribution system and its organization. 1A synthesises the contentious statements of witnesses and their partially substantiated evidence, to schematize a plausible causal network of what most likely occurred during the Walkerton crisis. Part 1B distends inquiry towards general provincial goals, ministerial policies, and forms of legislation, to

disclose how provincial governance facilitated the degradation of MOE's legislated sentence. 1B also alters the rules of engagement from 1A's interrogative form to include panel discussions and presentations from expert witnesses (e.g., policy analysts, Coroner's office, epidemiologists, government representatives). Finally, Part 2 metamorphoses the formal trappings of Public Inquiry (e.g., sworn oaths, testimony, catalogued evidence, interrogation, counsel, etc.) into a mobile public forum. Thus, in Part 2 Commissioner O'Connor travels across Ontario to observe different PUCs 'in action', gauge public concern, discuss policy alternatives with non-governmental organizations, and allow spectators a chance to suggest possible worlds beyond current legislation. This general form inverts Counsel's specific interrogation strategies (general form < specific application < particular constraint) by inquiring into 1) *descriptions* of situated constraint, 2) *norms* of conditional reason ('what were the standards of the time?') and adding 3) *prescriptions* of plausible conditions or plans for navigating uncertain constraints, after the Walkerton crisis.

Plans are pragmatic: William Trudell, Stan Koebel's lawyer will never place his client in a causal network where 'his intent was to harm the people of Walkerton': and must express statements that Commissioner O'Connor will interpret as proof of 'Stan Koebel's innocence from malicious intent'. Because plans belong to pragmatic figurations, other attorneys become concerned when statements are unmasked as such. For example, prior to testifying before the inquiry, Mayor Thomson and all the other witnesses file a *Will Say* that summarizes the statements they make under oath. Each witness constructs a *Will Say* under the guidance of Commission counsel or an attorney.

Mayor Thomson's plans become controversial because he has trouble recalling events during his testimony and frequently consults 'prepared notes' that extend his *Will Say*.

Prepared notes are not contemporaneous with the situations they signify, but are composed to synthesise multiple meetings and massive amounts of documents in consultation with Thomson's attorney. A prepared draft is sent to members of Commission counsel, who adapt its statements into a *Will Say* which they distribute to all participating disputants. Trudell, Stan Koebel's lawyer, finds fault with this procedure of dissemination because Mayor Thomson cannot recall specific conversations he has had with Koebel without referring to his prepared statements.

Trudell's disagreement forces us to consider the following points: What is the evidential status of these notes under the Commission of Inquiry? If notes are 'recollections that have been worked over', do they still convey the actual subjectivity of protagonists during key moments of decision related to the crisis? Or do they present the kinds of figurative subjectivity that a protagonist would rather have been during the crisis? Or, in a less sinister mood, do the synthesised notes present a composite form of subjectivity created by a dialogue between the mayor, his representative counsel, and artefacts documenting information that may not have been available to him during the questionable situations being reconstructed by the inquiry? Finally, if the mayor discovers from evidence collected 'after the fact' that he should have known about adverse samples of *E. coli*, since his subordinate officials admitted they knew, then will he reconfigure his statements to mitigate responsibility?

Of course, Trudell fails to mention how every attorney coaches his or her witness to deliver 'testimony satisfactory to one's cause', regardless of this rhetorical procedure's

substantiation in the case of Mayor Thomson as 'prepared notes'. Moreover, Commissioner O'Connor believes that, if disputants are aware of the fabrication process of *Will Say* statements, they will be able to conduct inquiry successfully:

In an Inquiry like this, where Commission counsel does prepare Will Say statements and there's a great amount of detail, it's understandable that there will be that type of reference (W1A00/11/30: 26).

Thus, each plan distributes sets of counterfactual situations, and each situation generates types of structures and operations that index the variable effects of an event (formal cause) across multiple perspectives of sensory ranges. Effects are evaluated and ordered probabilistically along 1) different thresholds of affectivity that belong to each witness's experience (e.g., 'this is tolerable, that isn't!') and 2) different gradations of conduct that witnesses formulate in conjunction with an attorney's or Crown Counsel's figuration: e.g., 'was your decision the best option for a maximum number of coordinated agents? It should have been, given your position in the causal network. Why couldn't you understand this expectation from your perspective? Is it because you didn't care?'

Affects are evaluated sensations: e.g., 'I care about this and don't care about that'. 'I want less pain and more pleasure'. Thus, there is an economy of affects (an organization) that must be maintained if the witness is to appear normal according to a distribution of values or 'ideological constellation' (Dewey 1938; Burke 2001) that spans a specific series of encounters: e.g., during a Public Inquiry in Ontario, calm affects reflect stable operations and 'draw less suspicion', while remaining calm during a funeral may attract attention. To control or maintain an economy, agency must become habitual, repetitious, *procedural*, for example, 'I know my testimony like the back of my hand'; but sometimes procedures develop beyond redundant confidence, slipping into a loss of

concentration or plunging into accidental negligence. MOE district supervisor Phil Bye delivers a testimony that is riddled with repetitious statements of 'I cannot recall'. In certain instances, however, forgetting may be the most successful rhetorical strategy against figurations of 'conspiracy' (W1A00/11/14: 50):

Rod McCloud (attorney for municipality of Brockton): And do you recall, sir, at some point during that day, the 24th, having a short, very short private conversation with the Mayor somewhere in the vicinity of that Council chamber, either in the chamber or out in the office area near the counter, wherein you said to the Mayor, "thank you for not pointing fingers"? **Phil Bye:** I don't recall that specific meeting or liaison with the Mayor. I can't recall -- I can't recall making that statement. I know that the Mayor and I talked after that meeting briefly but I can't specifically recall the....

An agent's affective economy constantly shifts in line with his or her anticipation of possible figurations (e.g., 'are you accusing me of something?') When Mike Harris, the Premier of Ontario, prior to and after the Walkerton crisis, testifies before the Commission, he 'crosses paths' with his interrogator, Commission counsel Mike Cavalluzzo, as both agents are unwilling to relinquish control over the interrogative process (W1B01/06/29: 72 – 73):

Q: Right. And you should be aware as well, of course, what the Common Sense Revolution talked about was a 15 percent reduction and -- and what that meant for the Ministry of the Environment was something like three hundred and sixty-five (365) positions --

A: Well --

Q: -- could I --

A: -- no -- no --

Q: -- could I -- excuse me, could I finish the question?

A: Well, just -- with respect, that's -- well, yes, go ahead.

Q: Okay. Let me finish the question, thank you. That's why I went to law school, so I could ask the questions.

A: Well --

Q: All right.

A: -- that's why I didn't.

Thus, affective control or 'returning emotions to their place' requires enforcement by traits of physical objects: material signs or formal transactions. In the case of formal transactions, humour becomes a recurring form of 'releasing tension' during particularly anxious moments of dispute and a defensive routine (Argyris 1992: 239 – 266) for 'saving face' when rhetorical procedures fail (Goffman 1967). For example, here is an encounter between Commissioner O'Connor, the Registrar, and Commission counsel, Brian Gover (W1A00/12/18: 125):

Brian Gover: Right. I need to take you to another item and perhaps I'll just come up and join you for a minute. And what I've shown you is Exhibit 31 -- let me take that back, Exhibit 56, tab 30. I've just made enemies of every lawyer in the room by taking you to the wrong document. **The Commissioner:** And the Commissioner. **Brian Gover:** And the Commissioner. The Registrar doesn't look happy either.

A common example of material signs is clothing, which covers a corporealized witness's surface effects: articles of clothing hide accidental forms, erections, incontinence, tremors, shakes, palsy, pigmentation, hair bristles, scars, moles, tattoos, 'deformities': they also manifest (or disguise) status, authority, profession, taste, style, counterculture, fantasy (i.e., role playing), individuality/collectivity, and so forth. Alongside clothing, various iconic figures (such as fetishes and totems) come to reinforce specific procedures by 'heightening the mood' or complicating an agent's affective range (e.g., occidental forms of pornography entail arousal, masturbation, guilt). As iconic figures evolve with practice, they become disassociated from procedural activity, that is, over time ritualized initiation becomes confidence, boredom, and so forth; still, icons continue to exemplify affective states long after initiatory practices have been shed: e.g., Buddha statues imply equipoise, crosses imply sacrifice, 'bottled water' implies cleanliness (despite physical tests), 'blown up images of bacteria' imply disgust, and

‘Walkerton water’ implies contamination (‘I only drink bottled water after the crisis’).

Finally, certain other physical objects are in between transactions and material signs, as combinations of both traits: ‘making faces’ or gesturing may imply desire, terror, or ridicule.

An interesting disclosure of fetishism occurs during the Walkerton inquiry when GAP President and microbiologist, Gary Palmateer guides the Commission through ‘the world of E. coli’. Because bacteria are unidentifiable within sensory ranges endogenous to human organisms, Palmateer requires an inferential technology that manifests through particular material signs: e.g., a Petri dish, bacterial colony, and diagram. Despite being separated from actual E. coli by a plastic container, attorneys and Commission counsel squirm in mild trepidation and disgust (W1A00/10/19: 35):

The Commissioner: I think they’re passing [the Petri dish] around, Mr. Palmateer. If anybody does want gloves, I don’t mean to make light of it.

The Witness: Okay. **Crown Counsel Ms. Kristjanson:** We’re a hardy bunch of souls.

Note how these three coordinated statements impart 1) an article of clothing (protective gloves), 2) a material object (the contaminated Petri dish) and 3) a joke, used to diffuse potential anxiety (by saying ‘we’re hardy’, Kristjanson validates her discomfort, while acknowledging its uncertain nature).

The identification of an affect with physical appearance mobilizes a fetish as the conceptual reinforcement (reminder) of correlated sensory tokens, in terms of cause/effect. Moreover, the sense or affection that constitutes a fetish comes to enforce its concept recursively; thus, at the threshold of fetishism persists the placebo, e.g., ‘this sugar pill worked because we told you it works, it failed after we told you it fails’. Sense is initially one step behind its concept but, with each enactment of the fetish, its tokens

begin to manifest the concept as traits within a sensory range. Traits designate values that can be attained, maintained, and exchanged through the achievement of procedural targets that produce verifiable states of fetishized goals. The MOE declares 'Clean Water for Ontarians', but this statement is meaningless without material signs that provide currency for the transaction of values (e.g., uniformed inspectors, televised images of 'people smiling and enjoying Ontario's water', odourless tap water). Without fetishism, humans would remain 'disaffected' and be incapable of goal-orientation. Thus, a fetish orients situated activity towards ideal goals by affection.

Values range over situations and weight tokens (e.g., events, goods, currency) from one perspective against those of another. Thus, evaluation builds descriptions, stabilizes common referents, normalizes exchange and distributes universals (e.g., capital goods, and categorical imperatives such as freedom and clean water).

Procedural targets build toward general, albeit domain specific goals: i.e., 'I want to be a scientist' or 'I want to build a home' or 'I want to drink clean water'. Though a goal's objective is ideal (scientist, home, clean water) its effectuation entails real activity. Thus, a goal requires a set of targeted paths that attain its designation of value without necessarily conforming to its objective: e.g., 'if PUC operators obey minimum MOE standards, they can avoid interventions by MOE officers' not 'obey minimum standards to protect Ontario's water resources'. Thus, values are simulacral in that their propositions can be actualized by more than one path: e.g., there is more than one way to 'act like a PUC Manager' or 'express minimum standards'. After all, values do not exist in physical reality; they belong to an individual's sensory range as measures of sufficient events, acts, etc., and require designations, if a common value is to form between agents.

‘What does a PUC Manager look like?’ So long as a minimum number of specific procedures are maintained, expressing ‘common denominators’ or referents most agreed upon by cooperating agencies, a PUC Manager will successfully pass the evaluative criteria of inspectors. All MOE officers refer to a Compliance Guideline when evaluating PUC operations. They also have access to protocols that relate specific observations of non-compliance with standard ways of selecting and phrasing appropriate orders, such as the ‘Communal Drinking Water Program’ (2001). However, each neighbourhood of coordinating agents normalizes and administers its own specific evaluative criteria, such that certain MOE district or area offices (e.g., Owen Sound) favour some characteristics (e.g., minimum conformance with Ontario Drinking Water Objectives) while regional planners prefer another set (e.g., compliance with the intent of the Ontario Water Resources Act; to maintain ‘safe drinking water’). When weighing these intra-organizational discrepancies, Commissioner O’Connor favours general uniformities over local variation (O’Connor 2002a: 329):

I do not propose to analyze whether the criteria in the Compliance Guideline, if interpreted narrowly, captured the Walkerton situation as it existed in 1998. If they did not, they should have. It is inconceivable to me that the MOE would issue guidelines for the use of mandatory abatement that would not have applied to the situation in Walkerton as described. Surely the repeated failures to conform, the broken promises, and the ignored warnings were enough to require mandatory measures.

Nevertheless, Commissioner O’Connor does not blame interpretational variance on individual officers of the Owen Sound office. General uniformities require a uniform pedagogical process such that regional planners are responsible for ensuring district officers are adequately trained and continually updated with new procedures as criteria of compliance change (O’Connor 2002a: 351).

Common referential denominators anchor the sentence of a protocol. But their agreed upon value and rate of exchange³⁷ across a group of coordinated agents may fall prey to the instability of fluctuating interests: e.g., Owen Sound district officers found greater currency using the term ‘conformance’ around PUCs as opposed to ‘compliance’; conformance suggests ‘voluntary abatement’ and expects PUC operators to be conscious of a duty to serve their public ‘clean water’; compliance suggests ‘mandatory abatement’ under a particular section of enforceable statutes and expects clients to be willing to contravene the rule of law. PUC operators belong to a municipal corporation, instituted by the Public Utilities Commission Act of Ontario (1990); thus, they appear similar to MOE officers, who also ‘serve the public’ by proclamation of law (i.e., MOE Act 1990). Because of this similarity, Owen Sound district officers expect PUCs to conform, and most do, eventually. However, the denominator of conformance encourages a ‘frame of mind’ in which MOE officers overlook ‘issues of non-conformance’ because they don’t believe that PUC operators would willingly contaminate an entire town. Of course, after Walkerton, conformance and voluntary abatement become controversial denominators: e.g., the Ontario Drinking Water Objectives are scrapped in favour of enforceable standards, while conformance guidelines are rephrased around issues of compliance.

Thus, denominators eventually mutate as coordinated agents express variations adapted to new situations that are incompatible with previously maintained norms and statements of value. Incompatibility effectuates a genealogy of values by separating common denominators from 1) ancestral paths (e.g., legends, maxims, prejudices) and/or atrophied branches of 2) vestigial traits (e.g., appendixes, repealed laws, clichés), 3)

³⁷ *Exchange rates depend on the swiftness and facility that agents express when using the denominator to enter transactions (e.g., breach topics).*

nonsensical meanings (e.g., 'round square'), and 4) ineffective propositions (e.g., 'that won't work').

Technology:

Concepts like desire, utility, need, belief, intention, etc., are not intrinsic to a particular agent's physical organization. There is no instinct or essential impulse to 'do X if Y occurs' apart from the effectuation of activity that correlates with the *prescriptions* (e.g., methods/schemes) of a specific *technology* that modifies events and its *formal* trappings (e.g., a language of reasons, an economy of tokens or goods, a game of coordination for tracking activity). Though technologies are reified in material forms (e.g., 'the wheel', a chlorinator, computers), each is an abstract order of reasons (expectation of utility) that orients agency to specific schemes and methods of procedural effectuation (e.g., 'how to manage a Waterworks'). The structure of technical order is a variation of four general forms of engagement: 1) transitivity of relations, 2) goal and design, 3) a replicable syntax which determines the transformation of observations into results, and 4) canonical examples (evaluative criteria) that guide agency along the effectuation process (so an agent knows 'I'm on the right track').

Though human organisms express sensorial uniformities (e.g., eyes, ears, nose, tongue, hands, epidermis), their individual experiences differentiate into practised sensory ranges (e.g., vision, taste, thermometer, lab analysis) that form contradictory and disputatious paths. As a result, a human agent is not born with a complete understanding of the situations she will encounter: her world of sense is metastable and uncertain. Thus, she must learn to adapt her expectations of past experience (e.g., typical events, cause/effect relations, structures/operations) to contain emergencies and defer fatal

encounters with disaster. A technology for building correct inferences (e.g., ‘9 times out of 10’) requires a dialogical relation between its agent and some form of mastery (‘a challenging environment’, an opponent, an instructor). Mastery imparts a design process: the agent observes tokens within the environment (e.g., ‘no animals ever drink from this pond’) that drive a case study (e.g., ‘how to find potable water’). In the form of a teacher or canonical text, mastery bears figural signs of practicality that attempt to effectuate a goal within the initiate’s organization by persuading her to adopt certain *prescriptions*. Regardless of the initiate’s understanding, each sign’s exemplary tokens schematize a figure that suggests what she should do to fulfill mastery’s order of reasons (instructions, methods, remedies); the figure also draws a plan of the goal’s design. For example, a doctor, dressed in a white lab coat, stands before a patient and hands her a *prescription*: ‘take two antibiotics every six hours for three weeks; *then* the infection should subside... if there are any complications call me’ (i.e., ‘check up’, to receive further instructions or variations of design). Every order of reasons entails a probable distribution of outcomes. Reasons are partially nested to a point of indecision: e.g., 1) the patient takes her medication; and 2) watches for complications; if 3) complications arise she calls back; if 4) no complications arise, she attends to more pressing concerns. The agent cannot jump to stage 4 without achieving 1 and 2. Stages 3 and 4 are counterfactual, either/or: each option hinges upon the negation of the other.

However, there is potential indeterminacy underlying the mutual exclusivity of possible worlds 3 and 4. The patient recognizes what she believes are symptoms according to a *prescribed order of reasons* (e.g., the doctor’s pamphlet on E. coli provides a checklist), her own *affective concerns* (e.g., cramps, diarrhoea, vomiting,

bloody stool, ‘can’t work’, arthritis) and *opinionated expectations* (e.g., ‘the symptoms could be a sign of stress and anxiety because I think I’m sick’). It is possible that a patient ‘fails to identify’ symptoms with actual events from her experience (e.g., ‘It’s probably nothing’) and succumbs to complications (having waited too long to ‘call back’). It is possible that a patient construes symptoms that a doctor is unable to verify (e.g., ‘Doctor, I keep feeling this pain in my heart.’ ‘That’s impossible, you merely have stomach cramps’). It is possible that a patient’s primary symptoms (e.g., of *E. coli* O157:H7) subside after the initial prescription, only to resurface with complications, months after. Thus, the distance between stages 3 and 4 effectuates many possible systems of plausible inference. The patient is uncertain about her passage between these indeterminate stages; therefore she must design a technology for identifying plausible forms amid uncertain truths. The doctor’s prescription materializes a technology of cause and effect: e.g., ‘take these antibiotics and your infection will subside... take this antihistamine and your symptoms of nausea will subside’. But prescriptions are disputatious: one doctor prescribes antibiotics; another doctor notes O157:H7’s correlation with hemorrhagic colitis and hemolytic uremic syndrome, decides antibiotics are ineffective and prescribes electrolyte fluid therapy, blood products, and dialysis (W1A01/01/17: 22). Thus when agents become patients, the feeling is of an initiation: plausibility takes over when our deliberate prescriptions fail to effectuate our intended goals (e.g., ‘stop puking’); moreover, if the doctor’s prescriptions fail, the patient is forced to reassess her initiation: e.g., ‘if these antibiotics work, why do I have bloody diarrhoea? I need a second opinion.’

Desires, beliefs, utilities, and so forth, comprise a scale of representative examples. An agent has to compare outcomes whereby a desire, belief, or utility diverges along counterfactual situations: 1a) either she acquires X and it satisfies her desire; 1b) she acquires X and it fails to satisfy; or 1c) she fails to acquire X; 2a) either her belief in X corresponds with a verifiable physical state Y; or 2b) her belief in X corresponds uncertainly with equally plausible states ('sometimes it's good and sometimes it's bad'). The representative scale emerges from prior experiences that an agent may have encountered and/or schematized; its logical form (which guides judgement) may have been transmitted along a pedagogical network in which the agent is an initiate; however, as soon as the scale's transmitted form contacts an agent's information process, it conforms to the agent's particular order of reasons and situated understanding. Once connected to particular observations, a representative scale determines the plausibility of evidence, the quality of information, and the likelihood of outcomes, given the applied technology (i.e., form of judgement) and stock of situations that respectively condition and constrain an agent's procedural inquiry.

Networks of plausible inference subtend locally consistent systems of truth-procedures that become increasingly uncertain as an agent extends her activity to outlying neighbourhoods of causality. Plausible inferences translate from one system of truth (e.g., a grammar of verifiable statements, laws, counterfactual situations) to another. Plausibility stretches out towards increasingly improbable but not necessarily impossible worlds. Plausible inferences range over indeterminacy. Impossible worlds (e.g., 'dirty tap water') require a state of exception (e.g., contamination) that is verifiable under law (e.g., Ontario Water Resources Act). Plausible inferences subtend multiple games of

coordination and offer a general survey of agents as individual paths of encounters across a network of relations; successful paths are measured by ratios of cause/effect and cost/benefit, alongside the frequency or propensity of typical events: e.g., critical events or 'bumps along the path' versus 'smooth sailing'.

Chapter 7: Coordination and Games of Exchange:

Games:

‘Who speaks for common sense?’ entails a problematic space equivalent to ‘whose reasoning maximally resembles a normal distribution of expectations among agents of a particular organization?’ Expectations map onto types of situations/procedures and organizations map onto games of coordination between multiple players. Each level of the organization is a game. Thus agencies play against others when coordinating activities (e.g., enforcement of drinking water protocols: MOE, PUC, Health Unit), and agents within specific agencies play against each other for limited resources, information and prestige (e.g., MOE inspectors generate merit increases by the number of field visits they compile within a certain span of time).

Here is a game-theoretic problem for verifying maximal success: given a probable distribution of possible worlds, whose thought is best able to 1) trace or *replicate* (Lewis 1969) the world line that covers a maximum of typical situations common to N players in a game of coordination, and therefore 2) signifies an optimal information process in relation to the game? The way strategic success is distributed determines whose plans are more valuable than others. For example, changing trends force the concept of success to shift in relation to a game’s dynamic world line, that is, if new situations are admitted into the game. The MOE admitted new protocols (e.g., updated ODWOs in 1994) but failed to inform its agents of any changing enforcement trends; as a result, the changes ‘made no difference’ to the game in play. However, changes to protocol may be effective over the long term, in the way that mating rituals and other forms of social initiation gradually transform across generations of performers (Skyrms 1996, Binmore 1998), whereby new forms are added and older forms suffer incursions without necessarily entailing outright

declarations that 'the game has changed'. The updated ODWOs became necessary when the players 'learned the hard way', i.e., the Walkerton crisis exposed 'the old enforcement procedures' as ineffective. Thus, a formal definition of success rests upon the evaluation of each player (agency) and what form of convention it takes within the organization, i.e., what positions it entails in the game (Lewis 1969). Here is what Lewis believes (1969:3):

Convention turns out to be a general sense of common interest; which sense all the members of the society express to one another, and which induces them to regulate their conduct by certain rules. I observe that it will be to my interest (e.g.) to leave another in possession of his goods, provided he will act in the same manner with regard to me. When this common sense of interest is mutually expressed and is known to both, it produces a suitable resolution and behaviour.

Thus, convention underlies forms of contract (Skyrms 1996) and effectuates the bounds of legislated obligation, i.e., as conventions change, formal laws become instituted or repealed. Moreover, the 'resolution of behaviour' that convention effectuates is not as univocally consistent as it sounds; conventions are not necessarily reducible to truth-procedural sentences. There are multiple players in a game of coordination and not all of them share the same information or methods of interpretation regarding their respective positions. Thus, each player will initiate bargaining, knowing the positions of some while having to guess the position of others. Accordingly, potential decisions effectuate a distribution of probabilities.

For example, here is a point of decision within the game of coordination maintaining Walkerton's ground water distribution system: If the MOE decides to stop inspecting PUC operations after 1998, the PUC Manager (Stan Koebel) can choose to concentrate on the municipal hydro project, which is becoming a pressing concern in light of the Ontario government's plans for deregulation (Energy Competition Act 1998). With

more time spent at regional meetings regarding municipal hydro and less time spent maintaining and repairing the distribution system (e.g., devising a solution for Well 5's exposure problem, which has been ongoing since the previous management of 1978), Koebel authorizes his brother Frank and the other operators to 'look after' the PUC's waterworks. Thus, Frank Koebel decides to lower the level of chlorination in order to reduce the taste of chlorine in Walkerton's tap water. Both Stan and Frank 'grew up without chlorinated water at home' (W1A00/12/18: 68). According to their narratives within the inquiry, chlorination is more of an aesthetic or way of training the senses (e.g., 'I don't like the taste') than a prevention of micro-organic contamination (W1A00/12/18: 72 – 73). Thus Stan (who recognizes MOE standards) merely approximates expected chlorine residuals, while Frank actually reduces his brother's efforts to comply by making his own adjustments several times a month. Frank's reasons are not necessarily malicious: as Stan notes: "he believed in the quality of the water, and the discomfort of having chlorination in the system – or that much chlorination [i.e., MOE's suggested 0.5 mg/L of water]" (W1A00/12/18: 74).

Furthermore, neither the PUC Manager nor his PUC operators understand the types of contamination that chlorination counter-effectuates. For them, *Cryptosporidium* is an indeterminate entity (e.g., no typical sense anchors its meaning). To be fair, it conjures a blank for most people uninitiated by the biological sciences. Even those who know 'it exists as some form of bacteria' cannot differentiate it from *Campylobacter*, *Escherichia coli*, or *Salmonella*, unless they specialize in a microbiological science and concentrate on organic pathogens (like Gary Palmateer). Moreover, it takes a different profession in medical science, Public Health, to model the epidemiological scheme of each micro-organic entity:

e.g., 'what are the effects of contact with our physical bodies and how rapidly can contagion spread across a population?' Thus, it may be hopeless to believe a PUC Manager will take the time to understand the internal relations of each micro-organic entity. However, the only proposition the PUC Manager need retain to operate Walkerton's waterworks in relation to micro-organic parameters is: 'bacteria in the tap water may kill members of the public'. With this exclusionary protocol set between the public and what must be 'banished outside the polis' (e.g., bacteria), a sentence³⁸ can be enforced by various coordinating agencies within the organization or game of coordination (e.g., MOE, PUC operators, Public Health Unit). Within this binary value, bacteria would become the suppressed side of clean water; but also a recurring structure that requires continual attention and habitual operation: e.g., 'keep sampling water to make sure bacteria don't escape chlorination'. PUC operators must watch out for bacteria. They must verify and (if warranted) attest to the fact that bacterial contaminants are not influencing the water distribution system. However, expectations (of obligation, contamination, etc.) develop according to the game in play. If $(N - 1)$ players have no understanding of bacterial contamination (e.g., its epidemiological effects) then they will be less affected by or involved with how the PUC maintains chlorination residuals. This is why expectations belong to a sentence whose truth-value varies according to the normal distribution of probabilities cast by each player. If more players regard chlorination as a less serious problem than the reorganization of municipal hydro across Ontario, the rules pertaining to the sentence's observation change. Thus, it will take a greater perturbation in the ground water system (Walkerton Tragedy) to stir the public's waning interest in bacterial contamination (e.g., 'Hydro bills are increasing!') toward the problem of 'clean water'.

³⁸ .A law binding the outlawed entity to a truth-procedure: 'keep water clean' 'chlorinate bacteria'

The Will and games of organization:

Organizations depend on games of exchange between agencies in varying stages of coordination. The content of exchange is information that translates from sensory ranges to typical situations, to conceptual schemes, to ideal goals; but the currency of information as it translates across situations takes the form of various tokens, commodities, proofs, and marks of distinction, whose value depends on the expectations of each exchanging agent. Thus the organization of Walkerton's PUC ground water distribution system develops by ongoing games of coordination. The exchanging agencies include the PUC, MOE, municipal council, members of Walkerton's public, the local Health Unit, (and outlying spectators, after the crisis). Each agency distributes a field of situated agents who observe 'contact points' and collect information that can be exchanged within the game. For example, the PUC conditions various operators who maintain the distribution system at a certain threshold of normality (e.g., observing chlorine residuals that are reported to the MOE). The MOE conditions inspectors who report on the efficiency and order of PUC operations. Inspectors are provincial officers who verify if PUC operators are adequately licensed and may issue orders of compliance if PUC procedures and facilities are in a 'state of non-compliance'. The public spans individual Walkerton residents who drink tap water and complain if they suspect a lack of quality, but it also vests individuals with rights under a sentence of legal promises and truth-procedures: e.g., MOE officers will ensure that 'your drinking water is safe'. The Health Unit employs Public Health Inspectors who monitor trends of public activity (e.g., 'residents are spreading rumours about the water') to identify possible epidemics and verify if disease does not entail a problem with PUC operations, alongside other matters

of public health, such as vaccination programs, that concern Walkerton residents and/or involve municipal corporations. Each inspector informs a Chief Medical Officer of Health who decides whether 'tap water is safe' or not and may issue a 'boil water advisory' for the entire town and outlying districts.

Moreover, agents gather information that is beneficial or detrimental to other coordinated agencies. For example, the Public Health Unit informs the public that a 'boil water advisory' is in effect without eliciting PUC assistance in substantiating the advisory's claim: "... a large number of people are suffering from bloody diarrhoea. The source of the illness has not been determined..." (W1A01/01/18: 66). The Health Unit 'jumps the gun' on the PUC and transmits a merely plausible statement or rumour to the public, because in a previous coordination Stan Koebel reassures the Chief Medical Officer of Health that 'the water is okay', despite the fact that earlier Health Unit water samples tested positive for E. coli (W1A00/11/29: 204). However, some Walkerton residents (including PUC Commissioner Stan Kieffer and his family) are unconvinced, await further substantiation, and continue drinking the water (W1A00/11/16: 155). The advisory also alerts the MOE that PUC operators are not in control of the water distribution system: given the advisory's indeterminate imputation of causality. Of course, the MOE may not look favourably upon the Health Unit's 'jumping the gun' because members of the public may question why the MOE failed to identify problems with PUC activity. As a result, the Chief Medical Officer of Health, Dr. Murray McQuigge, enters a position in which his statements offer a critical perspective upon the failed coordination of MOE officers and PUC operators (e.g., 'Koebel doesn't know what he's managing, but why hasn't the MOE curtailed him?'). Thus, early on in the crisis,

McQuigge is solicited by reporters from mass media outlets who interpret his opinion as authentic statements of condemnation. Nevertheless, McQuigge must be careful; his statements are merely plausible and unsubstantiated (e.g., 'a few adverse water samples don't indicate malice or even ignorance on the part of MOE officers'). His critical position within the game of coordination could end up eliciting counter-claims (a 'mudslinging contest') from the agencies his mass-mediated criticisms implicate. Thus, Walkerton's Mayor, David Thomson, publicly defends Stan Koebel against McQuigge's accusations of incompetence and deceit. But, as can happen with any form of merely plausible reasoning, Thomson's 'luck runs out': the Health Unit's adverse water samples eventually become substantiated by further tests, on the part of MOE staff and a consultant engineer. Now Thomson is forced to realize the fatality of publicly transmitting merely plausible judgements (opinion) from a position of authority (00/11/30: 42 – 43):

Q: Mayor Thomson, before we broke, we were discussing a special Council meeting, convened on Thursday, May 25th, at about 9:30 a.m. And you told us that you were emotionally upset in the course of that meeting; is that right, sir? **A:** Yes, I was. **Q:** And in fact you – you broke down in the course of the meeting; is that fair? **A:** Yes. **Q:** You were upset because you knew then that Dr. McQuigge's allegations about Mr. Koebel made in the May 23rd meeting seemed to be true; is that right? **A:** That's right. **Q:** And you were upset because there was a possibility of being seen by the public as having intentionally misled the public as a result of your May 24th comments to the press; is that fair? **A:** That's right.

As for McQuigge, he reconsiders his own critical stance and begins to make amends with MOE staff. Thus, Owen Sound Area Supervisor Phil Bye recounts (W1A00/11/13: 34):

Dr. McQuigge indicated he was calling to advise me that he had given an interview ... that was in today's paper. He advised that the article does not reflect his comments regarding the Ministry of the Environment local office... [I indicated] that that was unfortunate and advised him that myself and my staff have decided not to comment to the press on the

Walkerton matter as we don't feel it is appropriate given the circumstances... Murray's response was that was probably advice he should have taken a week ago and that he needs to rethink his actions with talking to the media.

Thus every decision made by each agency may jeopardize the position of every other involved, including the decision maker's; one decision may complicate a whole series of disparate interests.

An organization emerges from points of equilibrium within a game theoretic model of coordinating agencies external to each other (i.e., there is uncertainty as to what every other agency will decide). In a game of coordination (Lewis 1965; Skyrms 1996) equilibrium does not necessarily entail maximum payoffs for all agencies involved. It simply means that in an organization of N players, given the choices of each other player ($N-1$), the choice you make is optimal if it is not dominated by a 'better option' or way out. Furthermore, there are $(N-1)^n$ schemes of reasoning that you need to be aware of, but cannot possibly replicate entirely. Each player schematizes the choices of every other player such that they expect certain probable choices over others. Lewis calls this form of scheming replication because you simulate the reasoning of each other player to such orders of abstraction as 'reasoning about their reasoning about your reasoning about their reasoning, etc.'. Despite the orders of abstraction, your decision must ultimately return to constraints within your situation and 'what you want to do'. Similarly, an agency of multiple agents returns to its domain of operations by grounding replication in targets or tasks that require immediate attention for the effectuation of ideal goals.

Games of coordination are analogous to models of how body and mind achieve parity through the will: 1) The mind says 'don't act' and *typically* the body acts (as some form of non-action), simultaneously expressing codes of reason (concepts) and

understanding (types); 2) the mind says ‘don’t act’ and the body acts, thus expressing signs of its physical disparity with metaphysical codes, or the disjunction and/or dominance of one code over another (e.g., ‘his addiction got the better of him’). In both cases, body and mind entail varying degrees of coordination. In case 1, the act formally complies with (resembles, suffices, is typical of) a set of reasons (e.g., ‘don’t do...’) because it stops mid-sequence in an attempt, riposte, or operation. In case 2, the act is non-compliant either because A) reasons are insufficient, misunderstood, etc., or B) the act’s formal consistency is atypical, or C) the act resembles a ‘form of compulsion’, a desire, etc., that takes priority over the command or judgement of reason (i.e., *a priori* self-coding, wish, ‘personality trait’, affection, etc.). Case 1 is an efficient correlation of body and mind; moreover, it hinges upon a coordination of reason and understanding because the command can only be an efficient (target-oriented) enunciation if types of formally recognizable acts are involved (i.e., situated operations). Case 2 allows us to model (and repair) the internal consistency of case 1 when coordination fails to actualize its target: each subclass A, B, and C denotes an intervening variable that influences and may ultimately compromise, the coordination of body and mind.

In 2A) reason’s insufficiency could be due to an incompatibility between mental conditions and corporeal constraints, especially if the body belongs to an agency (i.e., set of conditions) other than the ‘commander’: e.g., ‘Get up!’ ‘No... I feel sick’. Another reason for insufficiency is an inconsistent set of thematic conditions. For example, Walkerton PUC Manager Stan Koebel asks his brother Frank to maintain chlorination at ‘standard levels’. However, Stan is unsure of which standards to authorize; thus he defers to his brother’s judgement: hopefully ‘two heads are better than one’.

Nevertheless, contradictions arise: the MOE specifies levels of chlorination, but members of the public complain if they taste chlorine in their tap water; and since 'no boil water advisories have ever been issued against the waterworks before', the operators continue along their unformulated path (W1A00/11/29: 65). Frank has been working with the PUC since he was seventeen; Stan joined a few years after, at nineteen. From years spent working together and under tacit management conditions (on par with Stan's '*laissez faire*' approach beginning in 1988) the two have learned to 'trust each other's judgement'. As long as nothing extraordinary occurs to expose their lack of general control, PUC operators 'go about their work' without reporting the problematic situations they observe: e.g., there is no archival space to track PUC operations and retain updated models of the distribution system; PUC Commissioners and municipal council are not informed of adverse water samples, etc.

If an MOE inspection arises, the PUC operators merely conform to whatever minimum standards are enunciated (i.e., *correlated equilibria*), or at least respond to the MOE in such a way that it will leave them alone, e.g., by sending documents that *assure* the ministry of PUC *compliance*. For example, MOE Environmental Officer-4 Don Hamilton, who was responsible for monitoring Walkerton PUC activity on a regular basis until 1999, considers the obligation 'demonstrate physically' as substantiated when the PUC Manager gives "some record or indication that the minimum recommended sampling program ...had occurred" (W1A00/11/07: 164). In this context, physical does not necessarily entail verifiable procedures within a sensory range maintained by the MOE; it merely entails signs transmitted and edited by PUC operators that indicate an occurrence.

As long as the PUC operators act as if they are complying, Hamilton's tracking system is satisfied. He does not have a choice. Budget cutbacks and dwindling staff within the office constrain him to monitoring as 'many PUC operations as possible'. Walkerton PUC is merely one particular case of over fifty different waterworks spread throughout the district monitored by the Owen Sound area office; even Hamilton cannot recall the exact number, despite having to evaluate the conformance of each one in 1997 (W1A00/11/07: 124). Continual inspections to every single PUC in the Owen Sound area would not allow Hamilton to accomplish any of the other sector targets required of him as a senior Environmental Officer; he also monitors sewage treatment programs and the industrial abatement of chemical waste which are usually more contentious issues of public concern than PUC conformance.

If a member of the public complains about the taste of Walkerton water, the PUC operators merely turn down the chlorinator. If lab samples test positive, the PUC operators merely flush the distribution system and increase chlorination until the readings 'go away'. These are all standard procedures or habitual responses to encounters ('minor events') but each entails insufficient reasoning because questions of causality are left unanswered: e.g., 'why does chlorine offend public taste? Why did adverse samples appear?' The problems don't 'go away,' they are simply deferred until the next round of encounters in the game of coordination between the PUC, Walkerton residents, and MOE officers. Counterfactual situations are left unexplored: e.g., instead of remaining in a correlated equilibrium of complaint/lower chlorine, MOE/increase chlorine, PUC operators could alter the form of chlorination until a new equilibrium is found between 'no complaints' and MOE conditions.

Regardless, if each other agency involved in PUC encounters chooses the same set of actions each time it plays against the PUC, there will be an equilibrium of evaluated formal recurrences such that each will be satisfied with the outcome: e.g., the MOE gets ‘documented evidence’ for its archive of inspection records, that substantiates PUC compliance regardless of what could really be occurring; the public gets water that doesn’t taste like chlorine; and the PUC operators can go about their work unhindered.

In summation: an organization emerges from various correlated equilibria that depend on how each agency involved in its game of decision replicates the reasoning of each other agency. If MOE inspectors expected the PUC operators to be inconsistent, they would demand more substantial proof of compliance (e.g., physical samples, a demonstration of PUC procedures, an overview of contingency plans in case of contamination, etc.). If the public expected the PUC to misunderstand the threat of contamination (e.g., if they knew that Koebel thought chlorination was mainly an aesthetic application and not a prevention against entities like E. coli O157:H7 that harm people), they would not be so worried about the taste of chlorine. If PUC operators expected the other agencies to be apprehensive of their choices, then more stringent protocols and conditions would be enforced. Thus sufficiency of reason depends entirely on the game in play and may become unhinged from physical constraints (e.g., the threat of bacterial contamination), depending on the equilibrium of choices that sets in.

Inside the MOE:

The Ministry of Environment situates Walkerton within a territory subordinate to its Owen Sound area office. During a three-year period leading in to the ‘Walkerton water crisis’ of 2000, this territory underwent a series of realignments as a result of MOE

reorganization. Prior to 1997, the MOE maintained a district office in Owen Sound that managed operations for Bruce, Grey, and Huron counties. As a district office, Owen Sound had a manager who organized the planning and deployment of MOE enforcement strategies throughout the three counties. On April 1, 1997, less than a month after the Owen Sound District Manager 'retired', the ministry downgraded the district office to an area annexed by the Barrie district office in London. As an area office, Owen Sound supports a District Supervisor who represents and reports to Barrie's District Manager. Any long-term strategies developing in the Owen Sound area require approval from the Barrie District Manager, such as the requisite number of inspections for specific industrial sectors *per annum*.

Nevertheless, Owen Sound's District Supervisor coordinates the activity of approximately five Environmental Officers belonging to the MOE's Operations Division. These officers range in procedural status from a trainee or EO2 to a full-fledged enforcement officer or EO4. At this point, I will concentrate on EO4s because they are responsible for monitoring the activity of municipal PUCs. In 2000, the number of EO4s operating in the Owen Sound area oscillated between four and five. Furthermore, the EO4s shifted focus from one county to another depending on the protocols they currently held. In a year, management would often redistribute protocols, for example, by assigning inspections of a specific activity. Reassignment forces officers into types of situations that scramble their individual information process; they must initiate new protocols, navigate unfamiliar domains, resituate conceptual traits, and reconfigure possible worlds: e.g., contacts made through a previous assignment in the industrial waste

sector become obsolete when monitoring the ground water treatment of municipalities; an expertise in PCB waste storage does not contribute to an understanding of E. coli strains.

The EO4 position mobilizes an agent whose expertise is general enough to actualize any and all of the MOE's 6 targeted goals (Business Plan 2000): cleaner air, cleaner water, cleaner land, healthier ecosystems, resource conservation, environmental stewardship. Each goal generates a set of objectives that frame the kinds of environmental parameters an officer may encounter at any given time. Objectives are ideal configurations of common sense that converge upon an EO4's situation and guide the officer's intentional activity. Objectives form a corpus that the EO4 inhabits. To become embedded in an environmental officer's situation, objectives require specific Ministry of Environment protocols that initiate the procedural effectuation of ideals; as such, a fully competent EO4 must emerge from the initiation of an EO2 trainee. In summation, an EO4's activity takes place within the context of a body of environmental legislation, regulations, standards, related policies, guidelines, procedures and an approved work plan.

The ontology I deploy to model an Environmental Officer's general domain differs from the collection of fine-grained entities that cluster around a technician's lab (viz. microbiology, organic chemistry, etc.). Unlike the lab technician, an EO4 takes a coarse grained approach to specifying traits of environmental entities like micro-organisms and water. To contrast: a micro-organism in GAP's domain manifests a set of trait-specific subsets that gather information³⁹ about temperature, pH, flagella, proteins.

³⁹ The 'aboutness' of information requires a sensory range that organizes informed structures through informing operations: temperature is meaningless (unstructured) without an operating thermo-meter (e.g., 'skin', mercury, etc.) to cut-set maximum and minimum bounds that order an information range (e.g., hot –

DNA, sugar, and acidity. Together, these traits identify an environmental entity for the GAP technician: 1) each trait is like a pillar that stabilizes the entity's structural integrity; 2) if the technician fails to register certain traits because events in the sensory range are indeterminate, she may not be able to identify the encountered 'entity'; 3) moreover, some traits are more adequate than others in establishing identity. Each trait couples situated measurements (of sensory tokens) with conceptualized parameters⁴⁰ that condition the identification of an experience: e.g., if your water sample's pH drops to 5 after applying broth, then you probably have coliforms; if not, you probably have 'something else' try X. An EO4 rarely operates on structures in the lab (i.e., to identify a possible contaminant); and when she requires lab work, protocols entail that she request an MOE technician from the Assessment Division to conduct chemical analysis on her behalf (within microphysical and microbiological domains, etc.). EO4s belong to the Operations Division, a distinction that aptly describes their approach. Protocols in Operations Division bind the Environmental Officer to domains of procedural traits. In such a domain, possible worlds of micro-organic entities become referents of procedural ratios. For example, if a lab notifies an EO4 that E. coli was identified in a PUC water sample, the EO4 does not gather information about its particular strain; she observes the bacteria as a token of procedural inefficiency and ramifies possible worlds within this parameter (e.g., the lab has to test more PUC samples, the PUC needs to increase chlorination).

cold). Beyond the maxi-min bounds information returns to chaos (e.g., how hot is it after the mercury in your thermometer boils dry?)

⁴⁰ *Parameters are ratios of structures: operations that an agent configures from past experience: e.g., inference is an operation that hinges upon my concept of a specific type of structure (ball) involving a specific type of operation (throwing) which in turn trigger a specific set of traits (ball falls down) of a possible entity X (gravity). If instead of a ball I threw a handful of air, my inference of gravity would be outside the set of traits normally available within my sensory range: I can't see air unassisted, therefore I have exceeded the parameters of this particular experiment experience.*

Games of coordination stabilizing the MOE:

To analyze the MOE's game space, we sort its institutional divisions (sets of agents correlated with specific goals) into 1) faculties of (conditioning) reason and 2) faculties of understanding (situated constraints). This sorting operation establishes generic sets of *a priori* schemes/methods that harness disparate agencies to specific legislative themes. For example, the general inter-ministerial denomination of Provincial Offences Officer (including EO4s and inspectors from other ministries) establishes an Operations Division within the MOE with its own performance manuals (how to record inspections) and enforcement policy (how to issue orders) that interface various branches of information process within the division: e.g., each officer communicates with agents from Investigations and Enforcement Branch (analysts, legal counsel, investigators, etc.), who formulate verifiable sentences of inspection protocols, techniques, and 'investigative aids' that authorize case-specific enforcement activities. Thus, if an officer wants to use a *device* for tracking a client's activity (e.g., espionage techniques, 'phone tapping'), he or she must first receive authorization 'from an Investigations and Enforcement Branch Field Coordinator, a Program Manager, Assistant Director, or Director' (MOE Investigative Aid Order 2000: 4).

Apart from their communications with other branches within Operations Division, such as the Environmental Assessments and Approvals Branch, which dispenses Certificates of Approval, officers coordinate with branches from Corporate Management Division (e.g., human resources, payroll), Environmental Sciences and Standards Division (e.g., lab services, regional monitoring programmes, standards development), and Integrated Environmental Planning Division (e.g., policy analysis including waste, water,

air, land). All divisions fall under a Project Management Office, which coordinates branch level information processes with political themes instituted by the Minister and his or her deputies in conjunction with inter-ministerial agencies like the Management Board of Cabinet that condition activity across the Ontario Public Service.

The general division between institutional reason and understanding structures a two-tiered information process: 1) generic sets of formal propositions (laws, goals, government promises, themes and transitively ordered methods and schemes: e.g., 'collect evidence *before* issuing orders') that may also entail axiomatic precedents (e.g., canonical examples of successful investigations or notorious crises and statistical models of past inspection rates, base rate frequencies of waste disposal activity); and 2) sets of *a posteriori* experiential proofs that substantiate goals, verify generic methods (viz. procedures), and archive situated tokens of schemes (e.g., 'how an inspector codes what she encounters during an inspection' *versus* 'what policy manuals state about encounters').

In the MOE, tier-2 frames an archival process of contact points between officers and clients that enforcement and surveillance activities generate. Its subsets (e.g., inspection files, correspondence records, order compliance forms, investigation binders, statistical distributions) translate into a continual reassessment and reformulation of generic propositions belonging to tier-1; thus, as new inspection files emerge within the archive, precedents shift to accommodate emerging axioms and integrate current inspection activities within the canon of exemplary performance. Moreover, as officers fail to achieve specific targets, goals are reframed during periodic policy cycles to accommodate the disparity between situations and expectations. Conversely, as policies shift (e.g., under public concern, budgetary constraints, etc.) they realign enforcement and surveillance

activities. For example, after Walkerton's crisis, prescriptive 'Drinking Water Objectives' or conformance guidelines become normative or legally enforced 'Drinking Water Standards' of compliance; thus, *post* Walkerton, managers authorize inspectors to 'strictly enforce' PUC compliance by issuing field orders. Prior to Walkerton, inspectors rarely issued orders against municipal entities, as conformance with 'Drinking Water Objectives' entailed an ongoing negotiation process ('to condition PUC operations') without fixed penalties (W1A00/10/31: 52). Thus, Walkerton becomes a canonical example of 'what happens when issues of conformance are left to the judgement of officers' and coordinates with 1) new legislation that transforms indeterminate conformance guidelines into fixed compliance plans (Drinking Water Protection Regulation, O. Reg. 459/00), and 2) formalized protocols for 'passing or failing municipally owned water treatment facilities' that reduce an officer's range of choice when determining compliance. Thus, less than five months after the Walkerton crisis, MOE managers dispense a general 'Work Plan Inspection Definition' (2000):

An inspection **must** include the following steps: 1) a file review prior to any field work which will include the following: Certificate of Approval application, operation and design plans, Financial Assurance, Occurrence Report Information System history, emission data, water quality data, annual non-compliance report (Dischargers Report) for air and sewage releases, and any other Control document; 2) a statement **clearly** outlining the facility/emission point/ process component you are inspecting; 3) a statement **clearly** outlining the requirements (Certificate of Approval conditions, sections of acts/regulations, specific guidelines) against which you will be assessing for compliance, as it relates to health and environmental concerns outlined in the Delivery Strategies; 4) a statement **clearly** outlining whether the facility is or is not complying with their requirements, as it relates to health and environmental concerns outlined in the Delivery Strategies. Finally, all inspection reports must be mailed to clients no later than **30 days** after the date of inspection.

Our bipartite institutional analysis becomes further complicated once we focus on games of coordination that organize disparate MOE agents (e.g., officers and planners) under varying degrees of uncertainty. A concept of coordination begs the question: if faculties of reason (tier-1) and understanding (tier-2) are disparate, how do they organize information exchange (translation) to maximize the achievement of institutional goals and optimize enforcement activity? At the very least, MOE agents must be able to defer the 'entropic drift' of institutional degradation (e.g., lost files, and unverifiable compliance issues) by maintaining some sort of minimum coordinated equilibrium of activity. The solution to facultative disparity entails a third kind of agent who depends on both tiers for information while belonging to neither. This third tier mobilizes agents of will, facilitators in between conditional reason and situated understanding who manage exchange rates between coordinating agencies. Thus, management establishes a *polis* from points of stability within each game. Points of stability are exchange equilibria that converge upon 1) features salient to most players: such as 'Pay day', or 'criteria of non-compliance'; 2) bargaining positions that dominate factions of players: such as 'union concerns', 'Conservative government electoral promises', or 'officers *versus* policy analysts'; and 3) distributions of exchange that plateau but 'pay off' or register information more consistently than the short term strategies of individual players: such as targeted inspection quotas versus 'inspections an officer would rather do'.

Combinations of equilibria allow forms of exchange to repeat; thus managers scan the game space (e.g., policy documents, emails, 'throne speeches', water sample rates, televised 'public tragedies', inspection reports) for salient features that reference a point of coordination for multiple agents within the organization. In classical forms of

occidental rhetoric, this procedure entails *kairos* (Pernot 2000: 28): a manager ‘looks for opportunities’ to coordinate policy proposals⁴¹ with enforcement procedures, to sway the game toward measurable goals and stabilize each officer’s situated information process along periodic cycles of incremental targets or tasks (e.g., annual inspection quotas) that register the achievement of goals. Thus the ‘MOE Business Plan 2000 – 2001’ specifies: 1) goals that thematize common referents (e.g., water) to coordinate facultative divisions and rally public confidence (e.g., promises); 2) measures that substantiate goals; 3) targets or tasks for officers that apply measures to specific situations and partially achieve goals; and 4) commitments that formulate an enforceable sentence (or protocol) which verifies the MOE’s current goal-orientation and codes enforcement and/or surveillance activity as truth-procedural assurance (2000: 13):

Goals	Measures	Targets	Commitments
Cleaner Water	Quality of Drinking Water	Communal water supplies that provide access to safe drinking water to Ontario residents	Ensure regulated health standards for drinking water are adhered to by undertaking inspections of all municipal water treatment facilities.
	Quality of ground and surface water	Improvement in specific indicators of Ontario’s aquatic ecosystems as measured by:	Ensure regulated standards are adhered to by undertaking inspections of at least 120 municipal sewage treatment facilities.
		Percentage of sport fish consumption restrictions in the Great Lakes reduced by 10% by the year 2010 (1995 base – 589 restrictions or 33.9% restricted.)	Apply the Water Quality index to three additional watersheds in Ontario. Establish a groundwater monitoring network of 7 key watersheds in Ontario.

The MOE’s game space offers a disjunctive synthesis of problematic, archival and generic series. Each series distributes tokens that allow analysts adjoining the institution (e.g., auditors, human resource specialists, sociologists) to track the activity of each kind of facultative agent: e.g., inspection reports, policy guidelines, and Ministry ‘vision

⁴¹ From upper management and Integrated Environmental Planning Division

statements'. Agents of understanding are authorized to inform the institution about ongoing environmental constraints: such as the number of compliance issues within a specific district of PUCs at any given time. Moreover, problematic cases of PUC operations, public complaints, and outbreaks of contamination may require immediate attention and demand intensive short term resource allocations to counter-effectuate critical events such as spills or outbreaks.

Officers execute Ontario laws and MOE standards across a series of encounters with clients, but they are also sensory ranges that translate problematic situations (e.g., non-compliance issues) into files within an archival process, which potentially informs faculties of conditional reason. Reason is nonsensical and aimless without an understanding of situations: ministry goals and their means (methods, measures, etc.) require series of encounters that commit them along counterfactual paths of problematic activity (e.g., one officer's inspections *versus* another's). Thus, managers treat each officer as a point of decision that actualizes the targets of instituted enforcement policies within an overarching network of Ontario government legislation. When an officer's activity compromises specific goals (e.g., cleaner water), managers turn to a more general (1st tier) point of decision, 'higher up' along the legislative path: in order to disseminate themes of 'damage control', 'public reassurance', etc., and develop enforcement situations counterfactual to the point that failed. For example, less than four months after the Walkerton water crisis erupts and over two months before the Walkerton Inquiry exposes 'a history of inadequate enforcement' on the part of Owen Sound area staff (O'Connor 2002b: 26), the MOE announces a new theme in August 2000: 'Operation Clean Water: the most comprehensive strategy ever undertaken in Ontario to ensure safe

drinking water and the protection of public health' (MOE Fact Sheet 2002). Thus, MOE managers *commit* a series of measurable encounters to counter-effectuate Walkerton's 'history of inadequate enforcement', and attempt to reframe or 'downplay' the water crisis within an order of reasons that includes its counterfactual (measures 'already underway') before Commissioner O'Connor has a chance to disseminate his findings to the public (Media Backgrounder 2000):

Other measures under Operation Clean Water include the inspection of all municipal waterworks to ensure they comply fully with laws intended to protect public health. These inspections are *already underway*, and will be conducted annually from now on.

Thus management is simultaneously 'policing and politicking'. This faculty regulates exchange rates to facilitate stable transfers of information from one branch or division to another and presents a consistent information process to external agencies and members of the public (e.g., 'how to get officers to relinquish cases to Investigations Branch without making them appear incompetent in front of clients'). Thus, as stable transfers increase, they build a *common sense* of 'how games should be played' across disparate internal branches and contact points with external forces: performance expectations, rules of engagement (e.g., 'saving face'), benefits, time limits on correspondence, standard forms of identification (e.g., POO ID cards, decals on inspection vehicles).

A manager works to organize as many disparate agencies as possible; thus, his or her activity emerges from the archival series of continually displacing conditions and constraints. However, managers are often 'stuck in the middle'; they cannot know everything an inspector understands (e.g., her 'gut instincts' and feelings about a client), nor are they privy to decisions of policy made by deputy ministers, Management Board of

Cabinet, or the Premiere. A manager tracks an inspector's understanding through files of case studies, inspection reports, correspondence records and interviews; and tracks general policy trends through incoming directives, audits, regional meetings and 'public announcements'.

Managers deploy schemes that are general enough to track the activity of disparate agents (e.g., administrators, officers, technicians, legal counsel) and to calibrate a maximum number of agents in relation to goal-oriented equilibria: officers report situations of non-compliance, administrators maintain reports, technicians assist with special cases, and counsel prosecute contraveners. Thus, directives from Management Board, where inter-ministerial policies and general performance measures develop, distribute standard figurations or profiles of agency across different forms of activity: from officers and technicians to administrators, policy analysts, human resource consultants, legal counsel, and district managers.

These figurations are intended to effectuate forms of competent subjectivity according to pan-situational ideals and their attendant governing principles: e.g., an *excellent* archival process = an information retrieval system that meets the specifications of the Archives of Ontario's 'Model File Directory Structure' (2000).

Thus, a document generated by Management Board's Corporate Policy Branch entitled *Framework for Corporate Management Directives* (1997: 6) outlines 'underlying values' to be shared by MOE staff with all Ontario Public Service (OPS) agents: integrity, openness, fairness, excellence, effectiveness, personal accountability. These ideals are unaccompanied by exemplary situations and are general enough to engage disparate

metaphors and procedural analogies within each ministry, i.e., the same values qualify Ministry of Environment, Ministry of Labour and Ministry of Education staff.

Nevertheless, each ideal offers managers a chance to configure an interpretation at the level of individual agent profiles (the agents they regulate). Thus each manager will use ideals to designate particular competency thresholds across a series of evaluated agents, i.e., typical forms of activity that managers expect from their staff. In other words, *certain profiles of activity* (e.g., an individual officer, a team, a district, a division) *that exceed normal expectations* (e.g., number of targeted inspections, minimum crisis management procedures) *temporarily set a competency threshold* (until the next policy cycle) *and become local manifestations of an ideal* ('deserving of merit increases') *or canonical examples of 'directives in action'* (e.g., 'success stories' to be disseminated through OPS bulletins). For example, a year after the Walkerton inquiry problematizes MOE water policies, managers scramble to canonize members of the Legal Services Division 'Walkerton Support Team' who 'provided information in a timely fashion' and 'aided Walkerton in cleaning up the disaster'; thus, agents belonging to the team (i.e., legal counsel) receive a *Ministry of the Attorney General Employee Recognition Award* (2001). The award is an inter-ministerial consolidation and a sign for all agents within the general organization of OPS agencies that the MOE is not without a polis and can adapt to disequilibria like the Walkerton crisis.

Methods and schemes require situated applications that involve the public and external agencies in legislated referents (e.g., 'PUC operations') and/or a common share of resources (e.g., 'water for Ontarians'). The MOE's polis is an indeterminate set of evaluated relations between management and its disparate faculties that cycles from one

correlated equilibrium to another according to changing conditions and updated constraints; yet agencies outside the institution certainly influence exchange rates and represent environmental forces that challenge the conditional reason and sensory range of MOE policies and procedures. Various MOE agents such as Operations Division perpetuate subgames with outside clients (PUCs, private industry, etc.) and may encounter jurisdictional boundaries established by competing institutions (e.g., Environment Canada).

However, the dialogue between MOE agents and outsiders is only meaningful *viz.* MOE goals within a general order of reasons specified by management. If managers considered verifying how an officer and client understood each other across an ongoing series of encounters, they would have to catalogue an ever-expanding repertoire of improvised types and affective codes that even the participants only have partial models of: e.g., what officers expected PUC operators to do, what PUC operators expected officers to do, what Officers expected PUC operators to expect, etc. On the other hand, a general order of reasons economizes expectations: e.g., a truth-procedural compliance plan fixes non-negotiable expectations such as 'zero tolerance for total coliforms'; the truth-procedure is all or none.

An economizing information retrieval system is also why MOE managers indeterminately code conformance issues within their archives: e.g., prior to Walkerton's crisis, the Occurrence Information System (1998) that maintains an electronic database of environmental hazards and activity only tracked non-compliance issues, thus excluding adverse water samples under the Ontario Drinking Water Objectives (W1A00/11/07: 150). With the MOE, conformance is an ongoing negotiation, ungrounded in law, whose forms (partially substantiated justifications or approximations) are intrinsic to a singular

encounter or point of decision that resists generalization: e.g., ‘how am I doing?’ ‘Try adjusting a little bit more’. Unfortunately, conformance negotiation was a dominant tactic used by Owen Sound area officers when dealing with Walkerton PUC operators. As a result, much of their negotiation process was left uncoded and forgotten by their archival process: e.g., MOE managers failed to train officers in applying the ODWOs or standardize individual interpretations of conformance (W1A00/11/07: 150); thus, there was no way for staff to compare and assess typical forms of conformance.

On the other hand, truth-procedural compliance plans may also become problematic. Because the MOE demands zero tolerance for all coliforms, lab technicians auditing samples simply have to determine a presence/absence test without generating a detailed typification of the entity’s effects: e.g., ‘what is the strain, how does it affect its host, how rapidly does it replicate, is it potentially fatal?’ Thus, the ratio between general expectations of reason (zero tolerance) and understanding (presence/absence) determines an information process that lets fine-grained entities (*E. coli* O157: H7) slip past. As a result, management not only mediates between disparate faculties but also maintains the web of meaningful relations that registers and specifies how officers may alter environmental forces.

With issues of compliance, MOE managers frame enforcement within a grammar of interpretation that merely registers an encounter (between officer and client) as falling within/without the recognizable bounds of a specific truth-procedural event: e.g., ‘all or none’, compliance/non-compliance, presence/absence, true/false. Yet, regardless of its aspect (e.g., bounded occurrence *versus* interminable negotiation), an event is meaningful

because it delivers the sense of a generic point of exchange⁴² that forms singular instances of passage (translation) from one situation to another (significance): e.g., law/exception, breaking point/emergence, basin of attraction, minimum tension, focus, equilibrium, threshold, mutation, etc. Compliance is not simply a form of appearance (presence/absence); it is a point of exchange within a causal network that 'alters the path of previous exchanges': e.g., Walkerton's water distribution system serves about 5,036 consumers whose variable positions within the network all become compromised when *E. coli* intervenes. Appearance does not adequately configure the effects of *E. coli*, nor does it allow MOE staff to assess likely points of contact with the intervening variable. Compliance merely asks: 'how many times does *E. coli* appear in PUC water samples?' not: 'how did *E. coli* likely become a variable within PUC water samples?'

The collection of aspectual series separates appearance from causality and configures the presence of contaminants (e.g., *E. coli*) as mere signs of non-compliance. However, compliance at least fixes penalties against PUCs when their samples or activities fall 'out of bounds'. Taken in its aspectual form, conformance is merely an interminable process. For example, Well 5 of Walkerton's ground water distribution system continually registers adverse samples since 1978. But Owen Sound district officers consider each collection of samples an indicator within an ongoing cycle of conformance: instead of problematizing Well 5's position within the water distribution system, the *presence* of adverse samples indicates that PUC operators should 'retake samples and if adverse results repeat, increase chlorination and flush the system until adverse results become *absent*' (W1A00/11/07: 144); then wait until samples indicate a *presence* and the cycle continues.

⁴² The point of exchange translates paths of force and information between physical and metaphysical systems: however disparate, force and information are seamlessly intertwined (pleats of matter and sense) within a sensory range, such that a uniform language of means can harness them both.

Once an agent analytically separates an event from the natural aspect in which it was discovered (i.e., questions of appearance no longer frame the problem), she or he simultaneously extracts a concept of meaning, which positions the event's generic point within an order of reasons or path of exchanges that overrides its natural form. Upon achieving separation, the singularity is denatured and no longer coded under the event of encounter. For example, instead of merely looking for the presence/absence of total coliforms, MOE staff could schematize Walkerton's probable points of contact with intervening variables of contamination; their concept of *E. coli* would now include variable forms of activity that increase the likelihood of contamination (neighbouring farms), and variable climatological constraints (storms) that exacerbate contact by overwhelming specific well sites (Well 5).

A causal network (or machine) harnesses and synthesises disparate processes and bounded occurrences to actualize as best it can a merely possible world (e.g., 'a water distribution system free of contaminants'); each singular variable or generic point of exchange within the network, was initially discovered as an event or prolonged series of negotiations. Once removed from its natural aspect, the generic point is an artificial variable that may be positioned anywhere along a causal network. Thus, building a causal network relies on a concept of experimentation as continual variation and, in its general form, discovery is the breaking point between natural and artificial forms.

Conversely, if an experienced singularity fails to correspond with axiomatic schemes ('it does nothing') and managers decide to forego negotiating counterfactual applications by closing down the process of discovery, its occurrence will be registered as a meaningless fluke, a mistake, 'a blank', 'none of the above' or an error in judgement. In

such a case, managers will ‘seriously consider’ the singularity if it repeats itself in crisis by disrupting their axioms (management principles) and exposing formal inconsistencies within their goal-orientation’s general order of reasons (e.g., methods are unfeasible).

Though inspection goals are prescribed by tier-1 planning agencies ‘above’ an officer, her procedural targets or tasks remain indeterminate: to be specified by her understanding of constraints within each situation she encounters. Thus, the set of procedures for actualizing goals through prescribed methods/schemes is also indeterminate. Officers are executive agents who have to ‘find a way’ from point A (generic set of methods/schemes) to point B (general goal of legislative themes): e.g., ‘here are the ODWOs, interpret them according to your situation.’ With each inspection, ‘finding a way’ entails choosing from counterfactual situations within a problematic space specific to targeted goals. Targets are not simply ‘increments of goals’ dependent on a conditioning faculty that stipulates ‘from above’; they are correlations of conditioned goals and situated tokens that an officer generates from types of inspections, investigations, operations, and structures that reflect her constraint driven information process across a series of encounters.

Thus, the freedom of choosing procedures to actualize methods/schemes places an officer along an indeterminate series of target problems whose solutions correlate with attempts at recursively finding ways to achieve general goals. Target problems may express values intrinsic to a particular situated agent (e.g., involving personal beliefs, desires and affects) even though management conceptualizes them as ‘simply means of arriving from point A to B’. Thus, situated agents who 1) gather information as sensory ranges, 2) effectuate goals through partially coded targets, and 3) alter physical structures

of organizations operate in varying degrees of disclosure. Some agents are anonymous figures (relative to a local game of coordination) who aim to effectuate a condition, gather information, and disappear from the scene, e.g., consultants, private investigators, ‘Environmental SWAT teams’; other agents work under tacit conditions ‘whose reasons are unknown’ along the lines of ‘that’s how we always do things’ thus drawing water samples, and increasing/decreasing chlorination without an understanding of their operation’s institutional significance. For example, Stan Koebel’s lawyer William Trudell, asks him during the Public Inquiry (W1A00/12/18: 21):

Do you feel that you, sir, had an understanding of – of water and the terminology and what was necessary? **Koebel:** Not – no, not the terminology, just the hands-on.

A final category of agents is completely unconscious, but sufficiently connected to an environment that they register the effects of a physical force within a particular sensory range: e.g., a meter for measuring chlorine residuals. MOE officers proceed within varying degrees of procedural consciousness: their targets are clarified by formal objectives, but they are not required to schematize possible outcomes related to a client’s non-conformance with objectives. For example, prior to the Walkerton crisis, Environmental Abatement Officers and S.W.I.P.⁴³ inspectors compared PUC operations with Ontario’s Drinking Water Objectives. The ODWOs specified measurable limits for various elements and organic compounds found in PUC water samples, as well as minimum levels of chlorination activity, etc. However, officers were not required to know about probable outcomes related to a client’s non-conformance with prescribed limits (W1A00/11/07: 149).

⁴³ *Sewage and Water Inspection Program*

Thus S.W.I.P inspector Michelle Zillinger (who inspected the Walkerton PUC in 1998) informs the PUC that *E. coli* is a controlled parameter under the ODWOs; but she only knows the effects of *E. coli* contamination in general terms (e.g., nausea, diarrhoea); and is not aware that pathogenic strains like O157:H7 cause 'hemolytic uremic syndrome', kidney failure, and possible death. Nevertheless, in her 1998 report, Zillinger recommends a Director's Order against the PUC (increase bacteriological monitoring and chlorination to reduce adverse sample results); but her supervisor, Phil Bye, after consulting with Don Hamilton (the main Environmental Officer responsible for Walkerton at the time) prefers to deliver a 'strongly worded letter' (W1A00/11/06: 74). Bye faults 'a lack of information' for not issuing a Director's Order, especially since the private lab analyzing PUC samples (A & L) had not contacted the MOE about the adverse samples Zillinger noted in her report (W1A00/11/13: 53). Bye expects that the lab will conform to the ODWOs and report verified samples of contaminants; as a result, he assumes the adverse samples are 'not repeating' and therefore are merely anomalous events (W1A00/11/13:54).

The Owen Sound district officers responsible for Walkerton's PUC also admit before Commissioner O'Connor that their knowledge of chlorination merely concentrates on what the ODWOs prescribe: e.g., 'chlorine residuals should approximate the minimum total chlorine residual of 0.5 mg/L' (O'Connor 2002b: 27). However, ODWOs do not specify the adequacy of disinfection related to minimum chlorine residuals (e.g., 'at what level is chlorination ineffective?') such that Owen Sound officers observe the Walkerton PUC maintaining chlorine residuals below 0.1, without ordering corrective measures or becoming alarmed (W1A00/11/06: 100 – 102). As Zillinger notes:

Certainly .05 would be a low level of free chlorine residual in the system. But [...] as to whether or not that is adequate in terms of its capability to

disinfect bacteria, I can't speak to that. I can only say definitely that the Drinking Water Objectives that [sic] a minimum detectable level be maintained throughout the distribution system (W1A00/11/06: 102 – 103).

In 1994 the MOE amended ODWOs to include “a requirement for continuous chlorine residual and turbidity monitoring for groundwater sources under the direct influence of surface water” (O'Connor 2002a: 305). Walkerton's Well 5 was an exemplary candidate for these stricter measures but was overlooked by inspectors for two reasons: 1) since the MOE did not instruct officers when updating ODWOs, most were only vaguely conscious of the amendment; and 2) inspectors visiting Walkerton sites failed to review past inspection files and thus remained unaware of Well 5's historically fragile state (O'Connor 2002a: 304 – 306). As O'Connor writes (2002a: 304):

[...Neither] the inspection forms nor any other instructions provided to inspectors directed them to review historical data or MOE files that might contain information about the quality of the water sources, even in the face of water test results showing deteriorating water quality from a particular source. Moreover, no time was allocated to inspectors for the extensive effort that may have been involved in locating and assessing information of this nature.

Thus Zillinger issues a ‘strongly worded cover letter’ with her report, which requires the PUC Manager to respond to her recommendations within 60 days. The PUC Manager Stan Koebel responds sending letters that promise conformance and list chlorine residuals; but there will be no follow up inspections and no face-to-face encounters between MOE agents and Walkerton PUC operators until after the Walkerton crisis in 2000.

Chapter 8: Plausible Inference and Uncertain Networks:

The Sentence and its Organization:

There is an undisclosed node acting as a source of contamination that offers a point of exchange between 1) Walkerton's ground water distribution system, a locally consistent system whose relations are contained by (or internal to) an organization of Walkerton's PUC and the MOE, and 2) an envioning metastability or global system of physical systems that mobilizes relations outside the survey of PUC and MOE agents which may influence the local system and alter its consistency (e.g., heavy storms and farming activity may distribute contaminants).

Though an organization's internal relations constitute the consistency of a local system, they may succumb to internal variation and mutate, decompose, conflict, etc., without necessarily entailing a 'force from the outside'. It is often the case that environmental forces from the outside influence the local system once its internal relations have already suffered decomposition, e.g., once preventive measures and procedures are deactivated or malfunctioning. Thus, a Public Inquiry does not hold E. coli O157: H7 responsible for Walkerton's disaster. This entity has no authority to represent its external relation with the ground water distribution system, not simply because there are no 'microbiological rights' or laws that can authorize it (i.e., make it a witness), but that this entity's relation to the local system is symptomatic of internal variables which establish a point of exchange between the outside where contaminants lie waiting and the self-contained organization. An organization is self-contained because it mobilizes a consistency of internal relations shared by agents, parts, nodes, etc., whose exchanges effectuate the system's targets.

Thus, 'keeping our tap water clean and potable' is a sentence (law) that correlates series of procedures involving disparate agencies (e.g., local water consumers, municipality, PUC, Public Health Unit, MOE, general lab technicians); each of these agencies executes its procedures to make the sentence verifiable across a set of normal situations ('unless someone wilfully contaminates the water, it *should* be adequate').

But when relations internal to and between agencies become inconsistent, the organization's sentence is no longer a certainty; its verifiability/falsifiability becomes indeterminate and undermines its standing as an effective truth-procedure. I say the sentence cannot be falsified because an inconsistent organization produces types of situations that have become indeterminate through misuse. For example, Walkerton's PUC does not simply fail to provide adequate sampling results, its Manager fabricates results from nonexistent referents, i.e., 'he guessed' (O'Connor 2002a: 197). As a result, monitoring agencies like the MOE (who provide a general survey of the organization to enforce its sentence) become destabilized because their models of PUC activity now belong to information detached from actual referents. Thus the force of a malfunction or inconsistent procedure can ripple along internal relations to eventually destabilize an entire organization. Moreover, if monitoring agencies fail to recognize a variable's indeterminacy (e.g., 'these chlorine residuals have been faked'), they may not be able to prevent destabilization: e.g., the PUC Manager's guesses fall within the range of appropriate results that substantiate adequate chlorination according to MOE methods of verification (O'Connor 2002a: 197).

Paradoxically, an organization's internal relations may be fully functional or partially dysfunctional without necessarily ensuring a uniform perception of security or

insecurity from all agents who share the local system: e.g., individually situated agents from public members to hydro-engineers, have their own style of cognitive process or understanding and may evaluate 'reasonable conditions' differently. Thus, the organization's sentence 'Walkerton has clean water' procedurally connects disparate agencies (as their goal: 'yes we want clean water'); but its truth-value does not go undisputed from one node to the next: e.g., 'I want clean water, but this organization has got a long way to go', 'I want clean water but not if it tastes like chlorine'.

There are thus two levels to the sentence: 1) It is a formal system of propositions that prescribes agential positions and reasonable conditions for each participating agency (e.g., duties, possible worlds) that altogether effectuate a common goal; but each proposition is subject to dispute once participating agencies compare their position with counterfactuals (e.g., A & L agents believe Walkerton PUC operators are responsible for notifying the MOE of contamination and *vice versa*). 2) Despite the counterfactual tensions that threaten its formal consistency, the sentence is an ideal that envelops disparate agencies within a uniform organization. The municipality, PUC, MOE, Health Unit, private lab, etc., operate in concert to realize a referent of 'clean water' that the sentence idealizes. But each agency effectuates its own specific targets, which do not necessarily involve the organization and may even involve different organizations with competing ideals (e.g., A & L's client confidentiality protocol).

Nevertheless the sentence binds each agency to a common referent (water) and entails a series of qualifications or premises that condition the referent's state (clean, potable, free, etc.). Binding establishes a protocol between subjects, i.e., a path of meaning causally connects each agency's set of positions, the agents it places, and the

local system where a common referent belongs. Protocols distribute responsibilities, likely outcomes, and penalties for agents who may ‘forget their place’ within the organization.

Moreover, the local system belongs to a community of subjects whose share of the referent (water) is a ‘public interest in clean water’ that must be protected. Thus, the sentence establishes a protocol or procedural contract between agencies of the organization and a public whose share in the common referent may not entail regulatory practice but does entail a capacity to *witness* situations involving the referent (e.g., ‘drinking the water’, ‘getting sick’, ‘calling the Public Health Unit’) in order to verify/falsify the organization’s realization of the goal (‘clean water’).

A community, however, involves subjects that may not comply with the sentence. Notwithstanding double agents who want to effectuate counterfactual targets (e.g., ‘poison the water’), the community gathers all who have a share in the common referent, including the inorganic elements that compose ‘water’, nonhuman animals, plants, bacteria, etc. Most of these nonhuman agents constitute external relations that intrude upon the organization’s containment of the local system and are incapable of cognizing the difference between inside and outside the organization. They simply involve the referent as part of their own systems (e.g., ‘plants and animals need water’) and remain external causes until an organization seizes control: e.g., organic and non-organic particulates in water are coded and parameterized by lab technicians, then controlled by artificial chlorination at levels corresponding to the established parameters.

But control is rarely absolute and is most effective when established along a system of witnesses whose verifiable testimony can be archived and updated. Entities

like arsenic and lead, micro-organisms like *E. coli* O157:H7 and *Cryptosporidium*, nonhuman animals like deer, cows, etc., cannot witness; their compliance with the sentence ('keep our water clean') is unverifiable. Only if a human witness or an extension of his or her sensory range (e.g., SCADA system) could continually survey and modulate these external relations would they become internally consistent to the organization and neutralized by the sentence.

Once an organization loses the truth-value of its sentence, its referent (portion of reality) becomes incoherent. A dilemma arises: 'is the tap water clean or not?' Intervening variables within the organization that prevent outside influences have succumbed to internal variation and no longer effectuate a consistent sentence about the ground water distribution system and its adjoining series of normal situations. For example, across the organization's disparate agencies are symptomatic gaps in the archival spaces of organizational memory: 1) the MOE has a ten-year span of documents (1980 to 1990) where not a single trace of Walkerton exists (O'Connor 2002a: 114); 2) until the disaster, PUC managers rarely contacted PUC Commissioners or municipal council, who rarely inquired about 'adverse sampling results' or chlorine residuals, etc. (O'Connor 2002b: 18).

However, the organization's disintegrating information process does not necessarily entail disaster: the town could 'be lucky' in the sense that 'everything will continue as it did before'. Of course, there are fewer methods available to 'cheat fate', given the lack of problematized internal relations: e.g., 'agents don't realize the organization is disintegrating' and 'don't change their habits'. Thus, internal relations are attempts at cheating fate (fatality) by domesticating reality. When all relations are

external there is no *sense* of security, no protocol or procedural contract to specify duties relating disparate agencies (regulation) to a public (witness-assertion), and no way to localize a common referent of the share ('clean water for Walkerton').

Truth and Plausibility:

If we plug our referential truth-value into a plausible inference machine we discover that truth's mutually exclusive binary value (T/F; either/or) can be situated along a probabilistic continuum from 0 to 1. 1 indicates a complete correlation of variables or positions such that their common referent appears consistent; 0 indicates no correlation such that a common referent appears inconsistent. In Bayesian terms, cognizing agents (e.g., observers, witnesses) determine the correlation of variables: 1 is an absolute certainty that the sentence is true and 0 is an absolute uncertainty; thus the continuum of probabilities is relative to some agent's situation and varies across agents. The correlated variables are nodes of exchange (organized agencies, public witnesses, external forces, etc.) The coefficient of their correlation is the consistency of the organization's sentence: an ideal correlation of 1 represents the organization's goal, 'the sentence is unconditionally true'. How far can each variable go before breaching the limit of truth's value? To determine variability we have to take a step beyond the association of variables as states grounded in a uniform statistical instance. We need to model how relations between variables are generated (i.e., their dynamics) so we can alter their causal path (Pearl 2000).

A dynamic model also allows us to assess how different situations belonging to an organization can alter an agent's belief and confidence in the sentence, as well as how disparately situated agents diverge in belief (e.g., public opinion). Thus, when I claim

that an organization's sentence must be consistent with a referential truth-value. I mean that agents belonging to the organization and public members belonging to its local system believe in the truth-value and *proceed* in line with its conditions (i.e., meaning, 'there is clean water in Walkerton'). This belief fluctuates within limits that define normal situations of activity under the condition of truth.

Thus, a concept of belief models the types of activity that preserve a sentence's consistency. If the water has an odour of chlorine but remains 'colourless', most residents will consider it normal, but if there is a sulphuric odour every time they turn the tap or if their children develop cramps and diarrhoea, the series of normal situations becomes inconsistent and entails a disruptive intervening variable. The sentence's truth-procedure has been compromised; but if agents learn to control intervening variables they may also restabilize their former positions: e.g., after Walkerton's crisis, the municipality exchanges the PUC (i.e., a faulty node) for the Ontario Clean Water Agency, whose agents reassure the public that 'clean water has returned'. However, the necessity of law has returned to the contingency of external relations; its absolute sovereignty has been exposed to the force of the exception⁴⁴ it maintained as impossible: e.g., the impossible sentence, 'drinking tap water is fatal', forces itself upon the organization to *claim* its own referential truth-value. In contradistinction, the organization's containment of a real referent (the preservation of water as a communal share) has been exposed to the unfinished multiplicity of reality where all is external to all – in other words, environmental metastability intervenes upon the local system once it becomes disorganized and returns to an 'unlawful' state of inconsistency (*viz.* internal variation).

⁴⁴ *Contamination is a state of exception; decontamination is the procedure that maintains its excision from the organization.*

Organization codes the local system of ground water distribution by subjecting it to a sentence. The sentence institutes the system within a protective domain (e.g., 'theatre of operations' or procedural territory) that defers (delays) the entropic drift of Reality (environing metastability). By delaying the real an organization creates a debt, a disparity between the sentence and the external forces its procedures defer. The sentence is ideal, a non-place that can only be actualized by the displacement of real forces, i.e., the maintenance of an exception to environmental metastability. Thus, alongside the debt an economy of procedures emerges to prolong the sentence's state of exception: e.g., the exception of contamination requires procedures of decontamination that entail chlorination, water sampling, hiring agents, monitoring activity, and transmitting reassurances to the public.

Thus, the sentence is a kind of gift (a pure forcing) that alters the consistency of reality by distinguishing inside from outside; distinction creates gradations of reality (values) where before there were simply volumes of sensation (e.g., surface effects, phenomenality) within a sensory range (Ruyer 1952). The sentence does not exist within a sensory range but persists as long as an organization repeats the meaningful operations that stabilize its referential structure (e.g., the local system, Walkerton's ground water distribution system).

Simulation:

The simulation heuristic, as modelled by Tversky and Kahneman (1979), allows agents to hypothesize variable positions within a causal network. Given a causal network of interconnected variables (i.e., a scheme of some situation) an agent can project a series of

possible worlds detailing conjectures of ‘what if’, ‘but for’, ‘if not’, ‘perhaps’, etc., that alter values for specific variables within the network.

As values change, the schematized situation (e.g., ‘*what we got*’) alters to another possible consistency (e.g., ‘*what we wanted*’). Simulation allows an agent to work over experience, to search for counterfactuals that could be actualized the next time a point of decision, leads to a situation similar to the one the agent intended to avoid. Kahneman and Tversky note three possible ways that values can be altered within a simulation: uphill, downhill and horizontal.

Uphill signifies a procedure of ordering variables within the network: each variable is a stage in the development of a systemic cause; the placement of variables ‘sets up’ the effect. The metaphor is constructive: variables build up to an effect; thus each must be specifically evaluated and strategically placed within the network, to actualize (or prevent) an appropriate effect.

Going uphill is also a strenuous metaphor: it entails effort on the part of an agent: surveying a field of variables, placing them in a proper causal order, economizing the time and energy spent attending to each, and working up to a critical point where the system ‘breaks symmetry’ and cause informs effect(s).

The downhill metaphor portrays effectuation; after a critical point ‘breaks symmetry’, the causal network runs the course of effectuation. Once downhill, an agent cannot alter the placement of variables without risking systemic failure; but values can be shifted to a point where the system gradually decelerates (e.g., altering PUC well sites *versus* merely increasing chlorination). Horizontal alterations occur when an agent

exchanges one variable within the network for another from outside (e.g., hiring a consultant to maintain PUC operations in place of the Manager).

Kahneman and Tversky's initial experiments with the simulation heuristic disclose cognitive obstructions that are commonly overlooked by agents using this technology. When given an initial causal network to work on, such as a scenario of a town like Walkerton with a contaminated water distribution system, agents rarely use the simulation heuristic to manipulate variables (i.e., proceeding uphill or horizontally). Most agents shift values within the network, thus missing simple solutions (by reconfiguration) to the problems specified by the network.

Kahneman and Tversky used multiple scenarios of a man killed in a car accident: when the scenario specified the man's route (e.g., he drove his normal route; he stopped at an amber light and was struck by an intoxicated teenager), most agents suggested the man should have altered his route instead of simply altering the time frame of his procedures.

Altering the route or path is a downhill adjustment because it operates within the scenario's spatial metaphor. Altering the time frame is an uphill adjustment because it reconfigures the scenario's (spatialized) causal network around temporal variables that have to be inserted by the interpreter. Thus, when Kahneman and Tversky reconfigured the scenario to reflect temporal order, they noticed less frequent adjustment to the man's route.

We can apply the simulation heuristic problem to Walkerton. The scenario Walkerton poses is a causal network wherein certain variables are hidden from the observer: there are too many interveners (e.g., climate, agriculture, PUC operators, MOE,

vegetation, hydrogeology, water consumption rates, chlorination) for the system to be completely contained by an organization. But some variables can be abstracted out of the network because certain connections successfully counter-effectuate their intervention: e.g. if adequate chlorination is in place, an agent does not have to worry about ‘every little microbe that slips in through the cracks’.

When PUC operators simulate Walkerton’s water distribution system, they must consider multiple variable outputs (e.g., work: chlorination, pipe maintenance, sampling) whose combination reaches a point where symmetry breaks and cause becomes effect: e.g., consumers stop complaining, the MOE stops inspecting. However, Stan Koebel’s statements before the Commission of Inquiry denote a water treatment system that has reached a plateau: there is no dissymmetry between cause and effect; the amount of work put into maintaining the system seems to be epiphenomenal because Koebel believes ‘Walkerton’s water is pure’ regardless of chlorinators, exposed wells, or stagnant water (W1A00/12/18: 74).

The MOE simulates Walkerton according to schemes of a normal causal network specific to a generic model of a town approximately Walkerton’s size, with about the same consumption rates. The outputs determining effectuation in the MOE scheme must match the projected values of the generic model (e.g., ‘Ontario’s Drinking Water Objectives’, ‘Chlorine Bulletin’). If PUC operators can produce the right outputs (i.e., ‘show inspector’s a proper chlorination schedule, sampling rates, etc.) then Walkerton’s causal network is systematically adequate.

The Public Health Unit models Walkerton from encounters with patients. Each patient is a variable within the causal network effectuating a simulation of the town’s

water distribution system. If patient's show signs of cramping, diarrhoea, etc., the system may be 'downhill, in the wrong direction'.

All three groups of agents partially model Walkerton's causal network. They are disparately situated and reflect disparate information processes in their simulation heuristic (i.e., when they want to find out what state the system is in). The problem for Walkerton is that the simulations of each became confined to particular uncorrelated situations, despite deploying correlated procedures or equilibria: each agent rarely exchanges one variable with another or reconfigures variables to project a set of alternatives to expectations of the 'game in play'; nor does each attempt to simulate the information process of every other ('to consider where they're coming from', etc.).

The simulation heuristic is powerful because it draws from an agent's situated experience (e.g., what I see and hear, what I understand as a doctor, a PUC operator, or MOE inspector). An agent can rapidly accelerate from a normal state of variables to a downhill effectuation. But building a new causal network requires a different perspective on the world and points of decision distinct from the ones each agent is comfortable with. In effect, the simulation heuristic is constrained by comfort, ease, and efficiency: learning new connections between familiar variables is uncomfortable, hard, and demanding. Crafting new variables is even harder. Thus, agents become 'stuck in a rut' and fail to diagnose mutating variables (e.g., problems, 'bumps') or effectuate repairs before systematic failure catches them downhill where 'it's too late to alter course'.

Rumour:

Rumour is the transmission of plausible reason. When logical relations of verifiable truth-procedures fail to anticipate situations, an agent turns to possible worlds and

calculates plausible relations among probable events. Logical relations are entailment, conjunction, disjunction, negation, predication, etc. Plausible relations require similar operators, but they form merely provisional premises in an inconsistent system of inferences that undergo continual revision: e.g., 1) I've been contaminated by E. Coli; 2) I've heard reports call it the 'hamburger disease' (O'Connor 2002b: 22); 3) I probably contacted it from something I ate; 4) but I'm a vegetarian; 5) nor have I changed my daily routine in any noticeable way. Premise 5 awaits further information; but the linear process of inference (i.e., 1 - 5) may be recycled through any point of decision that has gone before: e.g., 1b) the doctor misdiagnosed my condition, 2b) I have appendicitis, and so forth. Moreover, with plausible relations, the semantic contents of premises constrain what an agent can infer: e.g., 'hamburger disease' dissuades the agent from considering sources of contamination other than meat. Thus, plausible induction requires an agent who consciously manages an economy of information instead of merely executing the implicit conclusion of an established syllogism or trusting in the lawful consistency of a truth-procedural model.

Logical sentences guide an agent over a set of premises toward an inevitable conclusion (the calculation of proof). But in this configuration an agent need not analyze the structure of individual premises, for they are only verifiable within specific syntactically driven positions, such as predication, entailment, etc. When following a formal proof, agents are often overwhelmed by its monotonic condition - 'Obey the law, there is no other sufficient choice'.

However, agents often attempt to 'make sense of' a law by comparing its general conclusion to situations they have observed: e.g., Stan Koebel 'has never gotten sick from

unchlorinated water'; thus he does not consider the MOE's sentence 'maintain minimum bacteriological sampling requirements' a necessary predicate of 'water fit for public consumption'. As agents explore the contents of variable positions, they find particular elements of sense (e.g., encounters, acts/events, observations, precedents) that logical relations collect from disparate situations and meaningfully order into a generally consistent inferential system: e.g., instructions guide our tasks, maps lead us to goals, legislated rules standardize games ('play fair'), and agents secure relations by instituting truth-procedures ('traffic lights'). Thus, despite the syntactical drive of logical relations, an agent 'willing to obey' has to understand a set of applicable situations; otherwise the sentence may be meaningful, but it 'won't make sense': e.g., 'square circle' is equivalent to a formal relation of predicate(subject) but is impossible to imagine within a coherent world of sense.

Nevertheless, logical relations between contents are eternal forms, and the collection of verifiable contents obeys formal laws (e.g., syllogisms, set theoretical axioms). But as truth-procedures become uncertain, and syllogistic forms become aporetic, agents must turn to more content driven inferential technologies. The concept of technology straddles a number of disparate inferential formalisms. Some are logical and others are merely plausible; but in all circumstances, agents depend on formalisms for generating schemes and methods that map situations onto possible procedures. Kahneman and Tversky (1974) name a collection of these quasi-logical formalisms 'heuristic principles' because they assist agents in searching out 'minimally taxing solutions' to unstable problematic situations. For example, 1) **representativity**: canonical examples (e.g., anecdotal evidence, legends, descriptions, and salient features)

specify situated tokens that agents ‘look out for’, without necessarily correlating with a probable distribution of events; 2) **availability**: instances that ‘come to mind’ most easily are weighted more heavily than actual probabilities that require more effort to calculate; 3) **anchoring**: the first approximate value that an agent computes biases future estimations (Tversky & Kahneman 1974).

Every formalism contains certain variable positions that are categorical in relation to their conclusion: e.g., agents who want to schematize ‘the quality of water’ require (at least) a substantial category of water (tap water, ground water, surface water, etc.) and an accidental category of contingent predicates that qualify ‘kinds of water’. Thus, the variable positions held by a category (‘kinds of water’) and the formal relations it completes (e.g., ‘good water’, ‘bad water’) are general enough to accept multiple elements as contents (‘situations involving water’), but also specific enough for agents to discern substantial anchor points from accidental forms.

Despite their particular differences, certain elements belong within the same category and are consistent by virtue of being computed through the same equation of formal relations. Thus their outcomes fall within the same range of verifiable results, whose bounds are set by a calculating agent: e.g., a judge, or MOE inspector. For example, Canada’s Criminal Code categorizes Canadians, while Ontario’s Public Utilities Commission Act categorizes provincially located PUC operators, commissioners, municipalities, etc. Under the Criminal Code, all Canadians are banned from murdering others: $\neg M(C)$. Moreover, the syntax of this formal ban is consistent with logical relations belonging to nationalities outside Canada: e.g., Americans, Australians and Chinese share a similar concept of murder. However, the range of outcomes for

transgressing syntax ('the Law') may be different for each application of this logical formalism: e.g., 'murder entails possible capital punishment in Texas versus possible life imprisonment in Canada'.

Elements of interconnected categories are grouped into a domain of varying scope: e.g., affects, operations, entities, languages, tools, and figurations. Each of the interconnected categories (e.g., multiple substantiations, witnesses, etc.) partially fulfills the formal relations of a general law, but it only becomes verifiable once their network reaches a stage of formal completion and offers a conclusive position for judgement: e.g., 'after all the principle witnesses have given their testimony and the disputants have summarized their concerns'.

General laws branch out into specific formalisms of methods and schemes that guide an agent's verification process by forming a superstructure around collections of observable contents. This superstructure includes token appearances of typical situations and common affects alongside the signs of their conceptualization (e.g., 'a scene', 'a feeling' and 'how to see or feel it again'). Schemes map across elemental structures and methods map across elemental operations; they determine relations from one category to another: e.g., thirst(~water). Thus, logical formalisms guide interpreters toward a range of inevitable conclusions (e.g., effectuation of legal penalties, diagnosis of symptoms, following a recipe, exercising); but they do not permit agents to analyse and model individual elements using the same language of law that mobilizes their categorical position.

Under the law we cannot effectively question the premises of a particular syllogism (e.g., 'why can't I murder someone?') without bending reason into a

paradoxical state that converts categories into aporia (e.g., 'murder cannot be permitted and banned at the same time'). Once truth-procedures break down under an aporetic category they create points of dispute: e.g., an agent of Canada's military may kill people but this activity does not constitute murder; therefore the category of murder becomes stressed as agents compare forms of murder with their exceptions. If an agent considers 'killing human life' a representative statement of murder then military situations may be confounded with transgressions of the law (cf. a 'pacifist critique' of legalized violence).

When a legal category contains its own negation, certain elements problematize (question) the goal of its logical relations within the network of law: e.g., 'to prevent murder' *versus* 'protect the sovereign's dominance'. As formal relations along the network become diverted by variables of aporetic categories, they reconfigure truth-procedures. The old schemes and methods fail to register verifiable outcomes: e.g., 'if killing humans is not always murder, then human life is not categorically defined by the ban; thus some humans can be killed without entailing legal penalties'. Most agents can live under the contradiction of 'illegal murders' and 'legal human kills' by configuring murder into a subset of general kills alongside 'casualties of war' or 'destroyed enemies of the state'. But for those agents who maintain the preservation of human life as a universal pan-situational ideal, murder and permissible human kills institute a paradox.

As agents become uncertain about the bounds of a particular category (e.g., murder and killing become indeterminate), they dispute about possible solutions and proceed along plausible relations using 1) 'heuristic principles' (Tversky & Kahneman 1974), 2) frequency samples of formal occurrences (statistics), and 3) probabilistic inferences of future outcomes. All of these plausible formalisms are ways that agents

attempt to secure provisionally consistent relations (e.g., predictive causal networks, diagnostic measures, and gambles that are all subject to revision). Plausible relations do not necessarily conform to strict truth-procedures: provisional beliefs are updated by new information and revised by new concepts.

The provisional knowledge an agent structures under uncertainty varies within limits set by her situated information process; the sense of situated constraints adjusts and is modified by meaningful conditions. Provisional beliefs can change rapidly across a group of coordinating agents as rumours of plausible relations translate across their lines of communication. Rumour entails an informal organization of information exchanges unconditioned by logical formalisms: e.g., opinion, 'did you hear?' or 'this probably isn't true but...'

Though rumours rapidly spread across a network of agents, their meaningful connections are inconsistent as is their ability to effectuate goals, because opinions are merely uncertain contents of plausible relations: e.g., 'the telephone game', 'word of mouth', gossip, hyperbole. When agents require certainty, they demand truth-procedures or ways of instituting goals across a network of exchanges. Truth-seekers (e.g., agents affected by insecurity, anxiety) organize an institution whereby standardized information may be procured and disseminated. An institution of truth authorizes a logical formulation of sentences; each sentence maintains a set of consistent propositions, interconnected by standard modes of enunciation (statements). An agent articulates propositions through statements that respondents interpret. Articulation and interpretation depend on grammars that guide the translation of statements into proposed models, schemes, methods and ideals, etc., without being necessarily compatible: e.g.,

'that's meaningless' actually means, 'I don't have a model for your statement'.

Grammars not only optimize signal to noise ratios by normalizing means of expression (e.g., phonology, morphology, lexicography); they sort statements according to possible effects (e.g., warnings, jokes, imperatives) that narrow a respondent's interpretation of possible intentions or propositions.

Thus grammars normalize statements along three correlated registers of meaning:

1) syntactic, i.e., 'meaningful relations': entailment, conjunction, transitivity, substitution, negation, etc; 2) semantic, i.e., 'meaningful propositions': necessary, possible, probable, provisional ('it will do'), figurative, imaginable, conceivable, assertive, etc; and 3) pragmatic, i.e., 'meaningful effects': typical, regular, dependable, predictable, conventional, customary, goal-oriented, bargain, etc.

A successful truth-procedure depends on speakers and respondents with compatible grammars, suitable for translation. Moreover, the three kinds of registered meaning that structure each agent's interpretive process must correlate if agents intend to exchange statements that institute common referents and goals (e.g., signs of equilibria), for the coordination of understanding, sensibility (e.g., 'don't be afraid'), and activity. When an agent transmits meaningful statements, intended or interpreted, she, he or it manifests a 'figure responsible for the transmission' while presenting 'subjects of the transmission'. The former configures tokens of the pragmatic register: e.g., 'what is the agent trying to achieve? Who or what authorizes the agent to speak this way?' The latter entails semantic contents that substantiate reports, corroborate evidence, address respondents, and register events. Thus, in the role of transmitter, an agent maintains

figurations (e.g., signs of authority) that keep statements and propositions verifiably consistent along a specific, goal-oriented sentence.

When Public Health Inspector Beverley Middleton calls Walkerton's various public institutions (e.g., schools, retirement homes) to advise their administrators of a 'boil water advisory', she speaks on behalf of the Chief Medical Officer of Health who in turn represents the local Health Board. When a Provincial Offences Officer with the MOE issues a 'Director's Order', he is authorized by a District Manager who in turn represents a Regional Director. Neither the Public Health Inspector nor the Provincial Offences Officer can transmit such statements (at least not effectively) without the supposition of an authority figure (on the part of their interpreters). Sophisticated agents who are cognizant of pragmatic registration (i.e., a situation-specific capacity to affect others and effectuate goals through statements) develop rhetorical strategies that exploit compatible grammars. For example, lawyers must learn different ways of conveying causal relations according to the kind of dispute they're involved in: e.g., statements in tort law subscribe to propositions of *sine qua non* ('but for variable X there would be no injury'), while statements of Public Inquiry are meaningful if they propose multivariate analyses of systemic causes and avoid 'scapegoating witnesses' ('variable X influenced the injury in conjunction with variables Y and Z'). Lawyers involved in a Public Inquiry spanning multiple time periods must also confine accusations of misconduct to the legal standards of the period where the alleged misconduct occurred.

Sophisticated agents learn to utter statements in ways that increase the probability of intended effects and compatible interpretations in given situations (e.g., 'flatter your audience', 'look them in the eye', 'appeal to the greatest common denominator', 'don't

patronize', 'keep your message simple'). As agents refine rhetorical procedures, they categorize statements into standard figurations: 1) syntactical relations of propositions become catalogued as syllogisms with generalizable forms or moods (e.g., *Barbara*: if every A is B and every C is A, then every C is B); 2) semantic types become standard images and tropes that speakers rely on to convey common situations and affects, etc., but they can also be inefficient clichés or malapropisms that speakers avoid by signifying contextual shifts, i.e., *face-work* (Goffman 1967).

The institution of medicine establishes a figure, the doctor, who permits the impersonation of truth; once an agent becomes a doctor, her observations become diagnoses: e.g., the doctor speaks and discloses a vision of symptoms, 'you have colitis', etc. Diagnostic terms like 'colitis' are general significations (e.g., 'your colon appears inflamed') and manifest a clinical organization of symptoms without necessarily disclosing the specific cause of particular symptoms. By organizing symptoms according to her own diagnostic grammar, the doctor wrests the symptoms from her patient who in turn must relinquish authority ('I know my body') over to her in order to undergo a successful treatment: e.g., 'it hurts when I...' is a declaration of personal corporeality in which the patient is too involved, whereas 'colitis' proposes an isolated occurrence (apart from the patient) that could happen to anyone and is open to general observation. Doctors separate symptoms from patients in order to control a patient by turning corporeal symptoms into objectifiable manifestations of contamination.

The alignment of speech and vision (transmission, manifestation and proposition) actualizes the statement. But rumour does not cease: the organization of truth-procedures degrades into institutional factions, fraudulent impersonations, disjunctive ideals (e.g.,

‘what ought to be true’, ‘what you believe’, ‘what could be true’, ‘who cares’) and mistaken realities, such as a ‘misdiagnosis’, ‘cross-purposes’, or the PUC Manager’s ‘everything seemed fine’ (O’Connor 2002b: 19).

The history of medicine is pockmarked by situations of patients who have ‘miraculously’ healed themselves, effectuated placebos, refused medication, or developed incurable and inexplicable symptoms. Institutions relegate these indeterminate cases to archival heaps marked insoluble, deceptive, vague, etc; but the agents belonging to each case of indeterminacy take shelter in rumour. There are communities of plausible reasoning intercalated with every institution, (e.g., even theology has its apocryphal texts). Hypochondriacs learn to interpret Merc Manuals and prescribe medication; self-healers form factions (not quite legal institutions ‘frayed by opinion’) of alternative medicines. As plausible inferences strengthen connections along the network of agents by effectuating results more often than not, rumour begins to challenge instituted truth. Doctors and pharmacists integrate placebos with standard medical trials (e.g., the inexplicable becomes a control concept of normal situations and not ‘something to be feared’); hypochondriacs become manifestations of ‘psychosomatic’ illness; ‘shellshock’ and cowardice become ‘post-traumatic stress disorder’, and so forth.

Thus, an institution constantly refolds across a network of plausible inferences: ‘what’s uncertain today may become gospel tomorrow’. Under an institutional fold, the murmuring of rumour takes on the form of truth; its suggestions and suppositions become propositions and models of causality, while the shadowy inconsistent face of ‘rumour mongers’ appropriates the figurations and countenance of authority. For example, a Public Health Inspector tracks rumour. Unlike an MOE officer who articulates fixed

referential criteria when conducting inspections, a Public Health Inspector begins with an indeterminate situation. In Walkerton, the trail begins at noon on May 19th, two days before the 'boil water advisory'. Beverley Middleton and her fellow inspectors have adjourned from a meeting when lead inspector Dave Patterson informs them of a call received from Doctor Kristen Hallett. On May 18th, Doctor Hallett began treating two young children for symptoms of (non-specific) colitis; but as the day progressed, the symptoms became likely indicators of an infectious cause: e.g., vomiting and stomach cramps develop into bloody diarrhoea (W1A01/01/17: 12 – 13). Hallett looks for common themes that might place the children at a single contact point: e.g., a school barbecue or family gathering. The girl had eaten at McDonald's but the boy 'had been nowhere'. When Hallett returns the morning of May 19th to 'check up' on the children and consult with their mothers, she discovers that rumour has been working overtime (W1A01/01/17: 14 – 15):

Around 8:15 in the morning. The mothers had been talking and what they found out and shared with me was that there are more people that were sick, some -- and I've forgotten exactly, but someone had said how many kids had been off sick from Mother Theresa in that week and that they had heard that there are more cases in the emergency rooms.

A nurse tells Hallett that more patients are arriving with similar symptoms and are being treated with antibiotics. Hallett must make a decision: if the symptoms, e.g., bloody diarrhoea, are a plausible indication of the contaminant (*E. coli* O157:H7), then it is also plausible that antibiotics will not work, given the state of this specific strain of *E. Coli*. Thus Hallett holds off on prescribing antibiotics and calls the Public Health Unit to gather more information: e.g., are there enough 'sick people' to draw public concern?

When Middleton returns Hallett's call, she finds that the doctor is out. Thus, her first contact with the public is Joanne Todd, Managing Director of Maple Court Villa, a retirement home in Walkerton. Todd calls to report an 'enteric outbreak' among the residents: e.g., nausea, vomiting, diarrhoea. In the afternoon of May 19th, Todd speaks to the Maple Court's charge nurse who "had heard rumours of contaminated water in the town", again two days before the 'boil water advisory' (W1A01/01/15: 13). Todd decides to contact the PUC and verify the nurse's claim. An unidentifiable 'male voice' answers: Todd tells him about the rumour and asks for advice (W1A01/01/15: 14):

I was reassured that the water in the Town was okay, that there was no way the water in Walkerton could become contaminated because it came from deep wells.

As a result, Todd feels reassured by the public institution and decides to not pursue protective measures against what appears to be an 'isolated incident.' However, Todd's certainty lasts until May 21st, when another Maple Court nurse informs her of the 'boil water advisory'. That same day Dave Patterson from the Health Unit arrives to take stool samples from infected residents.

After Middleton speaks with Todd (still on the 19th), she successfully contacts Hallett, who tells her of the two children's condition. Hallett indicates her suspicion that the school is a likely point of contamination. Thus, late in the afternoon of May 19th, Middleton contacts a secretary from Mother Theresa school (W1A01/02/26: 39):

She noted that they had seen an increase in absenteeism at the school, that children were sick at school; they had sent four home. She had – there was no event that attended – or that happened at the same school. And at that time she indicated to me that a parent had said to her that there was something wrong with the Walkerton water, and she had asked me if I was aware of that... I was not aware that there was anything wrong with the Walkerton water.

After the conversation, Middleton calls Walkerton Public School and discovers that eight children were sent home earlier in the day with symptoms of cramping, diarrhoea, nausea, and some vomiting. Next, Middleton contacts Sacred Heart High School, whose representatives indicate that 'they had not seen any noticeable increase in absenteeism'.

The trail of conversations leads to the Emergency department at Walkerton Hospital. Middleton is looking for any unusual cases, 'something out of the norm' (W1A01/02/26: 41). The physician on-call provides her with case histories for eight patients 'that were all experiencing a three day history of bloody diarrhoea, cramping, etc.' From the information she has gathered, Middleton consults with inspector Patterson. They discuss the likelihood of a waterborne E. Coli outbreak versus other possible food sources (W1A01/02/26: 42- 43):

The – because of the rumours that had already been provided to me, that the community itself felt that there might be something wrong with the water, I also – the flood that Walkerton had had the weekend prior was throughout all our local media, so it was – was very well-noted.

Nevertheless, the Public Health Unit cannot afford to misdiagnose the situation.

Therefore Middleton continues her search. She receives a call from Lisa Streiter, an infection control nurse with the Brucelea Haven, a nursing home in Walkerton. Streiter informs Middleton that a number of Brucelea patients were succumbing to enteric symptoms and tells her of the rumours spreading throughout the home (W1A01/02/26: 45):

She said again that staff members had indicated that there was a rumour in the community that the water was bad and they wanted to know if they should be boiling the water. We discussed that and then they made the decision that, yes, they would-- would boil their water at that time and I concurred with their decision to do that.

Swayed by the tide of rumour, staff from Brucelea Haven decides that the risk of 'contaminated water' outweighs the possibility of an isolated incident within the home, and this decision is executed despite the fact that no one had yet been able to verify the presence of contaminants in Walkerton's water. The evening of May 19th, Middleton contacts a technician with the bacteriological lab stationed within the hospital where Doctor Hallett is treating her two young patients. Earlier in the day, Hallett had collected their stool samples and sent them to the lab for analysis. The technician informs Middleton that presumptive results would be available the next day and a verifiable confirmation would be available on May 21st. The following morning Middleton receives a call from Dave Patterson: the lab has reported presumptive E. coli results for one of the children. On May 21st afternoon, the Public Health Unit issues a boil water advisory over the local radio stations.

Predation and intelligence:

The plausible causal structures underlying Walkerton's crisis all converge upon a general problematic of human/nonhuman relations (e.g., humans/E. coli). However, before isolating this common cause or point of convergence, we must contextualize the domain of this problematic relationship (e.g., inhabitation, domesticity, agriculture, waste management). Thus, I offer the following question as a heuristic device: 'why won't Canadians eat dog?'

Dogs cooperate with humans and express signs of enculturated understanding (e.g., herding dogs, police dogs). Cows, on the other hand, do not assist humans willingly; they don't have to concentrate on procedures that will help the human actualize her schemes. To herd cows, a dog has to coordinate activity with a human's gestures; in

return, the human offers him food, shelter, and possible comfort; many humans in this kind of coordination feel as if they've enacted a contractual agreement, e.g., 'not just a dog, but a friend'. A cow coordinates with humans in less complex patterns of activity (non-contractual, informally initiated coordination); she gets grass and a stable, but has to stand around for awhile and let herself get milked. In line with this divergence, dogs have the privilege of dwelling in human spaces and are accorded rights under the law.

In Ontario cows have certain rights as livestock (e.g., 'cruelty to animals', Ministry of Agriculture protocols) but should not roam around city streets or dwell inside human spaces (e.g., to contrast India's sacred cow). Dogs in the city must comply with human rules, but it is their owners who bare the responsibility of compliance, e.g., 'pooper scoopers'. Cows on the farm are not accorded the privilege of purification: cow shit is merely a by-product of bovine industry; it is recycled into manure for fertilizing fields.

Thus, cow subjectivities are not separated from cow physicalities: e.g., a dog has personality; a cow (unless she lives on a family farm) is a percentage of milk production, a percentile deficit of food stocks, a quantity of manure, and a percentile deficit of electricity and water of a total investment of capital (including antibiotics, hormones, etc.). A farmer does not share the same perspective on cow manure as he does on dog shit and human feces. Human feces are not recyclable; they are excremental impurities (Delaporte 2000) and no longer a part of the body: cf. a common English expletive, 'Eat shit!' Cow manure entails an industrial process; not only can it be refined into an organic compost for assisting vegetal growth, it must be incorporated as a stage within the overall industrial process that treats cows: e.g., waste is sluiced directly from where the cows

rest, feed, and are milked; liquefied waste becomes concentrated into storage tanks. to await redistribution.

But manure is not ‘unholy shit’, it is a product of bovine industry and therefore not an alarming event when it comes out of phase with the entire process: e.g., not all the manure is removed from the cows’ space; though not the case in Walkerton, storage tanks may seep liquid waste into the environment and effectively influence water cycles. A farmer who produces milk must worry about the quality of milk above all other factors; every other problem is a target within the overall goal of maximizing milk production to satisfy quotas. Problems with manure are incidental in relation to the overall goal, mere contingencies, that are calculated schematically without an accompanying situation type: e.g., a farmer does not know what a ‘seepage of liquid waste’ looks like or how directly it affects the environment (contamination), until he or she actually encounters the situation (as an accident, rumour or authorized bulletin).

Nor does a farmer necessarily consider what possible environmental sources are influenced by merely ‘fertilizing the field’ because manure facilitates crop production. This situation’s typicality dominates forms of contamination because ‘a field is fertilized, not contaminated’. In his report, Commissioner O’Connor concludes that Walkerton’s water distribution system was likely influenced by ‘manure spread on a farm’ within a few metres of Well 5 (O’Connor 2002b: 3; MOE Technical Report 2000: 29). This well was the Walkerton PUC’s least protected site. Its construction was such that, when depicted along a causal network, certain internal variables (e.g., shallow aquifer, fragile bedrock, open spring source) would expose it to outside influences (e.g., ‘contaminated surface water runoff’). In 1978, Walkerton’s municipality and PUC constructed Well 5

as a 'temporary source' of ground water while they searched for more permanent sites to solve the town's 'hard water' problem.

The farmer 'spreading manure on his field' complied with legislated agricultural conditions. Consequently, the presence of *E. coli* became a continual event in relation to Well 5. Water samples from the well positively indicated *E. coli* as early as 1978 and continued unheeded until the crisis in 2000, whereby the well was closed permanently (O'Connor 2002: 112; MOE Technical Report 2000: 44).

Styles of Reasoning:

Agents who favour dialogical reason are information processors whose statements articulate an affective range (*in situs*) and bind objectives to subjective expected values (of exchange). These agents are translators, negotiators, instructors, officers, advocates, marketers, etc. Agents who 'don't favour dialogical reason' appear unaffected by interactions; they favour analogical reason: e.g., statements become formalized into a network of variables whose syntax is analogous to their causal ordering of propositions. Metaphors of analogical reason are often formed around a generic world of systems theory (e.g., concepts refer to models that refer to simulations that refer to concepts, etc.). Most humans cannot remain consistent in a purely systematic domain; they express too many variables to be sufficiently coded by a uniform network of propositions (e.g., tastes cycle unpredictably, affects would require their own neighbourhoods and become disassociated from their host).

However, many nonhuman entities operate solely within analogical reason (without necessarily entailing reflexive consciousness, which is dialogical): e.g., computerized 'expert systems' and 'software agents' can sufficiently navigate

information environments through a limited number of variable positions within a causal network, whose parameters are defined by a specific programming language and generated by computational algorithms (Pearl 1988; Benthem 1991; Bradshaw 1997). As yet, 'expert systems' and 'software agents' cannot self-program when 'faced' with unverifiable constraints or merely plausible conditions (e.g., context is 'built in'); they employ human engineers who establish and authenticate dialogical relations with the environment by encoding types in advance (Button et al 1995; Clancey 1997: 218).

Between the two extremes of reason appears our average human information processor. In any given process of deliberation, this agent often mixes metaphors from both kinds of reasoning: e.g., names of categories, algebraic terms, numerals, subjective expectations, and ostensive definitions from situated experience. He or she also partially integrates multivariate models of causality with canonical examples from experience: e.g., when Don Hamilton is asked why he advised MOE officials against involving the Public Health Unit during the Walkerton crisis, he reveals a categorical expectation that 'all Public Health Inspectors make the same choices'; thus a 'bad experience' from a past encounter supervenes upon his assessment of the current situation's complexity. In a previous incident, Hamilton recommended a boil water advisory for the village of Feversham in Grey County; but the local Public Health Unit decided against his 'better judgement', at least according to his perspective (W1A00/11/07: 196 – 202).

Agents who mix orders of reason theorize causal networks that cannot achieve the complexity of a trained and initiated analogous reasoner (e.g., mathematician, statistician, physicist). However, they do not express (nor are they generally expected to signify) as much affective intensity as agents trained or initiated in dialogical reason (e.g., poets,

merchants, reporters, etc.). Women are often categorized within this latter group: as 'emotional', 'responsive', and 'communal' (Harding 1986; Bordo 1987; Harraway 1988). Separating a biological species according to cognitive schemes is risky at best; however, as feminism and androcentric cultures attest, gendered distinctions are taught to agents at an early age and structured throughout periodic cycles of an agent's life; often coinciding with biological phases: e.g., puberty rites and revelations of adulthood coincide with apprenticeships, formal education, and legitimated courtships.

Economic conditions in many cultures (labour divisions throughout North America, Africa, South America, Asia, etc.) cycle 'women's procedures' around the commercial district of their community: e.g., 'buying and selling at the market', 'estimating consumption rates', 'accounting for supplies', 'cost/benefit analysis', 'profiting from investment', 'negotiating exchanges', 'organizing local industry and charity', 'assessing rumours', etc.). These 'encounters in the marketplace' entail agents who practice dialogical reason: by interpreting events 'on the fly'. Mothers who teach their children to 'choose judiciously', bargain for goods, organize meals, buy groceries, and plan for contingencies (Lave 1988; Certeau et al 1998) become an important source of information during the Walkerton inquiry. As rumours of tragedy travel throughout networks of opinion, reporters turn to them for 'reaction statements', 'participant observations', 'affective assessments', and 'subjective probabilities'. For example, as Sue Ann Ellis recounts in the Walkerton Herald-Times (2001 May 15th)

One year after E. coli was found in Walkerton's water, Donna Berberich is still angry. "I've got kids who may have permanent disabilities and he's going on with his life," she said of former PUC manager Stan Koebel. "I can forgive the last 20 years and the false records. But even if he would have admitted there were problems days earlier, it may have saved a life ...it will take a long time to forgive that." As she looks over the pages of

over 50 hospital visits and ongoing tests for her two daughters, she recalls the last 12 months.

In contrast, most epidemiologists rarely get a full page report beyond 'scientific journals'; however, their opinion frames statements of 'a mother's concern' within a general causal network of analogous events, such that her situation becomes an isolated incident or an epidemic, a national crisis or a local issue. For example, "This incident represents the first documented outbreak of *Escherichia coli* O157:H7 infection associated with a treated municipal water supply in Canada and the largest multi-bacterial waterborne outbreak in Canada to date" (Health Canada 2000: 1).

Thus, when base probabilities are lacking (e.g., 'there's no other incident like Walkerton's to compare with'), observers order opinion along 'scales of representativity', whereby opinions are weighted according to anchor points that each observer takes from reports of 'particular situations': a mother's concern, a description of symptoms, etc. Each observer's weighted preference (e.g., believable opinion) does not have to positively correlate with every others': they read different stories, hear different rumours, disparately favour certain anchor points over others (e.g., 'I trust a mother's word over some insensitive bureaucrat').

As a result, the partially constituted causal network of each observer reflects the reactions of others (their statements, symptoms, affects, etc.) and does not necessarily schematize a probable distribution of physical events (e.g., the chances of contact with *E. Coli* O157:H7), which is a requisite procedure for establishing preventive conditions.

Nevertheless, rumour has its place in deliberate inquiry, and in the case of Walkerton, rumour was one step ahead of the MOE's instituted information process. If the participants in MOE's preventive system conformed to its standards, the Walkerton

crisis would have likely been prevented: e.g., if A & L had contacted MOE's Owen Sound office about the adverse samples of May 2000, if Stan and Frank Koebel had not falsified chlorination records. The preventive system only works if all participants 'conform to their expected position'. One 'false move' and every other position's access to information becomes compromised. Thus, if A & L fails to notify, the MOE doesn't know what's happening with the PUC; the PUC doesn't know how serious the situation is; the Public Health Unit can't issue a 'boil water advisory'; and members of the public have no idea they're in danger.

But when formal systems degrade, informal networks (mixed formalities) take over an agent's information process. Diana Adams is a Walkerton mother of three who testifies before the Commission (W1A01/01/16). She describes what her youngest son looked like on May 23, 2000: after 'cramping, vomiting and excreting diarrhoea'; she talks about her concern and fear upon discovering that the juice she prepared for her son contained contaminated water; she tells Commission counsel what other mothers said when they met at the grocery store, and relates the conversations she had with school officials, doctors, PUC operators, and Public Health Inspectors.

In other words, dialogical reason is the fabric of efficient information exchanges. This 'give and take' of signs, and on the spot translation of statements into propositions is informal, disputatious, and fraught with dilemmas and misunderstandings, rumour and passion. But there is no other efficient way for the most number of agents to exchange information with the least amount of investment (e.g., we don't ordinarily establish formal rules of conduct when entering a conversation, nor do we usually define our terms in advance of using them).

The clarification of ambiguous locutions and garbled statements would maximize exchange rates at the cost of sub-optimally generating an infinitely extensive grammar of translation rules, syntactical relations, precedents, representative examples, ostensive tokens, clichés, and unverifiable propositions. The debt in supporting such a task would bury any civilization (e.g., ‘like the Tower of Babel’). Thus, agents are left with ‘making do with what they’ve got’. Each agent is an adaptive information processor: e.g., women and men were not born into discretely mathematic or poetic worlds of sense; they adopt and adapt technologies that are passed along a mutating line of cultural transmission (Guattari 1995).

Culture’s roots (*Paideia*) are bound with the law (*Nomos*); both institutions place an agent within a causal network (*Socius*) that constrains her identity, profession, activity, and pedagogy. The law reflects upon culture as its ideal: e.g., respect property, trust authority, pay taxes, and respect others (Ontario’s Good Samaritan Act). Culture reflects upon law as its historical precedent, its practical executor, its currency, evolution and cultivation. The relationship of these institutions reveals a common undoing: the abyss of law is nihilism, a realization that signs are empty (e.g., pure signification: ‘Uh!’ ‘What was that?’ ‘It could mean anything’). Nihilism is also the abyss of culture because through the emptiness of signs, an agent realizes that on a physical level humans lead a meaningless asignifying existence where every act is as sufficient as any other (cf. existentialism). Despite these periodic bouts of extreme melancholy, agents depend on culturally conditioned expectations to navigate through the *Socius*.

The essential meaninglessness of signs is also their infinite capacity for configuring sense (‘whatever I experience, I can think about’); an essentially anchorless

mind is also an adaptive one, suited to surviving a metastable environment (e.g., ‘all I need is space and time’, the rest is simulated). Thus anchors are heuristic principles, ways that humans take to cheat the information process and skip ahead of ‘what’s currently available’ by matching encounters with typical situations or general themes.

However, anchors can obstruct an agent’s attention to detail and may cause non-salient but nevertheless vital points to be overlooked. Thus, MOE officers ignore Walkerton PUC’s poor training record and its operators’ lack of certifications (O’Connor 2002b: 28). Their salient features are anchored in measurements of minimal compliance, specific tokens that primarily quantify the disparity between regional MOE goals and district inspection targets. Thus the S.W.I.P. program of periodic inspection and sampling is satisfied by Michelle Zillinger’s visit in 1998 (00/11/07: 43 – 43). Zillinger reports that Stan Koebel does not sample chlorinated water from the recommended distance of 15 minutes injection time, but samples from an area earlier on in the distributor (e.g., at the pump-house before chlorine has adequately diffused and residuals are less accurate samples of the system as a whole). Zillinger does not, however, inform Koebel about his discrepancy (‘no discussion’; W1A00/11/07: 43); her reason to the Commission for not following up on this conformance issue is because she expected Koebel would improve his conduct like any other PUC Manager, and he did not indicate any misunderstanding (i.e., she did not interpret any...).

Art and Science:

Cultures that institute the interdependence of dialogical and analogical styles of reasoning are becoming increasingly important for initiating human information processors. As institutions within the Ontario Public Service (e.g., MOE) begin converting their ‘paper

trail' archives into digital media, they require mediators or intercessors who can translate informal reports from field agents (e.g., officers) into 'formalized computer databases', 'hypertext media', and 'graphic user interfaces'. Moreover, digital archives require content analysts who survey fields of data to enforce quality control, update cases, add dialogical context, maintain and retrieve records, and quantify tokens of activity to measure the achievement of goals. The OPS has implemented a domain of Systems Officers (CMD Info 1998); however, they are general computer technicians who install software, encrypt files, monitor user profiles (e.g., 'we know you've been downloading porn'), and repair hardware without being able to assess content.

For example, a Systems Officer can tell a S.W.I.P. inspector how to 'troubleshoot software problems' but cannot assist her in creating meaningful categories for tracking and assessing probabilities of compliance. The OPS does not train Systems Officers to manage causal networks; they merely facilitate the interface between 'information technologies' and field agents (e.g., 'the desktop', Microsoft Windows).

Of course, some professions have always taken advantage of these complementary systems of reason; and all professional forms require an informal dose of one system to counterbalance the other: e.g., gossip in a bureaucratic work environment can be just as important for an agent's career as 'pushing the forms'; office politics are dialogical forms of reason (e.g., performance management meetings: a Manager says 'what do you think I said?' an Inspector says 'I thought you said...'), as is dealing with clients (Argyris 1992).

Doctors, for example, dispense an informal diagnostic art that evolves across series of encounters with patients and fellow practitioners (Pinch et al. 1997): e.g., 'how

to judge stomach pains', 'locating internal organs', 'when is a mole something more?' Each doctor recognizes typical encounters (e.g., a sharp stomach pain normally means appendicitis), but must be flexible enough to adapt her stock of situations when an aberration occurs: e.g., the first child Doctor Hallett observes on May 18th 'has a known history of diabetes', 'has sharp stomach pains and blood in his stool.' 'What could it mean?' 'Run a stool analysis to get more information' (W1A01/01/17: 10).

But doctors also rely on a science of medicine with its taxonomy of viruses and bacteria, its prescriptions, anatomical models and epidemiological histories. For example, Health Canada's *E. coli* taxonomy includes (2001: 1):

Survival outside host: butter - up to 50 minutes; cream - 10 days; hamburger meat- survives well; does not survive in slurry systems (inoculum of 10^8 cfu/mL became undetectable after 9 days); survives well in contaminated feces and soil, only small reduction in organism number over 2 months.

Thus art and science - two orders of reason for training understanding - become integrated in a single figuration of professional subjectivity: 1) art concentrates understanding around particular situations (*hic et nunc*), it hones judgement (e.g., how many points of decision between 'what you see' and 'how you feel'?); 2) science distends understanding toward formal generalities that an agent can 'count on' to unlock the situations she encounters, it hones intuition (e.g., general signs clear a causal path through situations). We observe the doctor's clinical gaze, but also note her care in treating patients and responding to their fears (e.g., Hippocratic oath).

A question of causality:

Deliberate Public Inquiry imputes a causal network that is distinct from the truth-procedural syllogisms of criminal law. For example, the contravention of legislated

statutes and regulations is all or none: either an agent is judged guilty or not. Moreover, guilt implies intent, such that judgement frames a condemned agent with the necessity of foreknowing which activities are punishable contraventions of normal procedure (e.g., ‘I didn’t know’ *versus* ‘It’s your duty to find out’). Neither is deliberate inquiry completely transposable into tort law, whose judgement articulates the deliberative process of plausible inference but concludes with a balance of probability test that ‘averages out’ insoluble variables in favour of a ‘most plausible’ explanation.

The causal network schematized under Ontario’s Public Inquiries Act and Commissioner O’Connor’s rule establishes a probabilistic assessment of plausible relations; it accepts indeterminate situations (e.g., a witness’s partially remembered observations are still plausible, and taken into consideration) and hidden variables yet to be determined (e.g., as disputants shift the perspective of inquiry, they alter the general causal network by introducing variables). Tort law exists in a world of stabilized relations, normalized procedures and fixed subjectivities that persist across a uniform network of variables (e.g., balance of probability). Despite its multiple variations, tort law ‘banks on’ mutually exclusive categories of disputation: plaintiff *versus* defendant. Here witnesses either belong to the plaintiff’s cause or the defendant’s. Moreover, agents cannot be forced to exchange the figurations of a plaintiff for those of a defendant: e.g., accusations of injustice levelled against the plaintiff are only actionable in another case of judgement (counter suit), whereby the agent who was plaintiff becomes a defendant.

In deliberate Public Inquiry, an agent continually modifies her presentation of self in line with the queries, accusations, and retorts of multiple disputants, who confront her and each other: e.g., disputants who form an alliance or ‘common front’ under one line of

questioning ('to save face') may diverge and question each other's competence under another, without entailing a contradiction within the grammar of Public Inquiry.

In criminal law there are no hidden variables to consider; nor are there admissible subcontracts, organizational protocols, etc., that supersede the institution of Law. For example, all Canadians fall under the Criminal Code and become subject to scripted figurations within its legislated, juridical process: 1) an accused agent is arrested or summoned by an officer and taken before a justice to issue a plea regarding her indictment (guilty/not guilty), e.g., even a refusal to plead is taken as a 'not guilty' statement and the process continues; 2) witnesses are served a summons to disclose evidence regarding the accused; 3) Crown counsel attempts to substantiate the accused agent's guilt and proposes the indictment on behalf of Canada's sovereign; 4) if the justice decides an accused is guilty, punitive damages are affixed to the sentence (e.g., as time served, a set fine, or community service). Once an accused is convicted, she becomes a criminal with a verifiable conviction record (that may be subject to possible appeals). Note how criminal law manifests the will of a sovereign and not that of victims as in tort law.

Tort law subscribes to a sentencing grammar whereby statements of guilt comprise a logical formalism of 'but for': e.g., 'but for X, Walkerton would have avoided tragedy.' Public Inquiry complicates statements of 'but for' because the very sentence structure (legal framework) that substantiates claims and damages (e.g., Ontario Water Resources Act, Public Utilities Act) is also under dispute (for having been ineffectively enforced).

During a Public Inquiry (in Ontario), opposing figurations indeterminately merge into dilemmas, paradoxes, and partial models of counterfactual situations. The Commissioner begins with the fragmented information process of multiple agents in dispute in order to conclude plausible reasons for the destabilization of their instituted organization (e.g., a systematic failure of laws). Thus, the programme of Public Inquiry is three-fold: 1) *Descriptive*: 'what happened?' 2) *Normative*: 'how could it happen?' and 3) *Prescriptive*: 'what should we do?'

The goal of criminal law is to punish transgressors of sovereign rule. The goal of tort law is to find fault and compensate victims. The goals of deliberate inquiry are to establish plausible grounds (from the claims of multiple disputants) upon which to build preventive measures (e.g., 'so this tragedy never happens again'), recalibrate failed protocols (e.g., objectives become standards), warn future disputants, and determine critical points of systematic failure. Moreover, deliberate inquiry is an open process that continually revises its structure in anticipation of ongoing situations: e.g., the order of disputants and witnesses may change according to circumstance, and new evidence is admissible without prior warning.

Deliberate inquiry manages an economy of information; tort law authenticates subjectivity through victimization ('I have a right to take this situation personally, and claim damages'); and criminal law justifies sovereignty ('*feeding Leviathan*'). Deliberate inquiry mediates between 1) revisionist history as multiple perspectives of reality and contradictory interpretations of law, and 2) the memorial of law as legal precedence, and case studies of canonical examples.

Criminal law abides by historical revisionism because sovereignty is 'eternally present' and 'always speaking' (e.g., legislated statutes are amended or repealed by a ritual process that enacts sovereign will). Tort law attempts to transcend historical revisionism by substantiating the necessity of victimization (e.g., 'my perception of injury was not merely a point of view or interpretation of subjective utility, but a most probable fact'). Deliberate inquiry however, emerges from the threshold of ignorance (e.g., 'no one *really* knows what happened at Walkerton') to distribute a plausible network of causal inferences and preventive measures.

Nevertheless, all forms of law impute practices of memorialization to contend with historical revisionism. The court transcript found in all three is a substantial form of precedence. Without a trace of deliberate activity in the courtroom, a testament of oaths sworn, a record of evidence, a catalogue of statements, a framework to unmask contradictory figurations (e.g., witnesses who are 'twofaced'), the Law would be at the mercy of speech. Thus, the memorial of registration (e.g., the official post of registrar) stands in the way of sophists and of sovereigns with short memories.

Conclusion:

As long as there have been institutions and agents of truth, there have been specialists of rumour. The sophists made their life's work a documentation and commentary of insolubles: i.e., 'problems without answers', 'perspectives without reasons', 'situations without subjects', etc., (Pernot 2000; Rescher 2001). Sorities, aporetics, and eristics are not mere 'brain teasers'; they train agents in managing plausible inferences, troubleshooting causal networks, and negotiating problematic situations.

Only through mistakes do we learn how to act: e.g., when I perform a task flawlessly I do not review the intervals between my initial awareness of the task and its completion; I look forward to the next task so that it resolves itself as successfully as the last.

Perfection does not offer positions of self-criticism: it has already learned the technique (and all its stages) that allows an agent to complete forms within a general domain of similar tasks (by analogy). Perfection completes the ontology of inquiry: it closes down any future disputes regarding the task's status as a problem or counterfactual situation. But when agents make mistakes, they must discover means of identifying their error. Inquiry surveys a field of possible errors, a field whose relations inevitably lead to formal laws that have become compromised: e.g., an error 'proves an exception to the rule'.

However, inquiry does not necessarily entail chaos: an agent's environment may be metastable but her habits, memories, calculations, interpretations, friendships, and common sense stabilize a world of sense that she in-habits (e.g., the world of sense). To navigate the world, an agent requires means. Connecting situations, clearing paths, and forecasting events are activities that entail formal relations between variable positions: e.g., it is a logical implication that, to prevent contamination, a PUC Manager should chlorinate the water distribution system. Thus, not only does an agent manifest encounters with her environment, she also formalizes means for preventing encounters. Meaning and sense are interdependent cognitive systems: in its abstract form, detached from sense, meaning is pure theory or mathematics; in its abstract form, detached from meaning, sense is random *poiēsis*, indeterminate, white noise, fleeting, forgotten, '...', etc. Thus, inquiry maintains a correlation between meaning and sense.

A system of inquiry enculturates agents into an organization of coordinated activity. Across a group of exchanging agents, forms of inquiry adapt into pedagogy, whereby some master others and instruct them to apply means and make sense (e.g., how to ask questions, what to look for, how to position yourself, things to avoid, canonical

examples, key references, experts, models, radicals, heretics, and statements you shouldn't make). More often than not, inquiry emerges from a pedagogical frame (cliché: 'the school of life') where tested methods and proven schemes are habitually deployed along procedural searches through one's environment (Tversky & Kahneman 1974).

Inquiry does not necessarily entail a new perspective or 'open mind'. Heuristic principles, stereotypes, biases, prejudices, approximations, guesses, beliefs, models, and maps have been replicating and mutating alongside the human species since its cultural inception. Community strategies and *formal currencies* continue to thrive as new generations replenish the games of coordination in play: professions, the public, citizenship, tax payers, religions, arts, sports, government, corporations, organizations (e.g., Wildlife Preserve, park, water distribution system, and ghetto). As a result, the situated individual is hardly alone in her environment. Agents coordinate and develop consistent forms of activity that permit the transmission and modification of structures and operations pertaining to each (e.g., *technology*: the technique of chlorination, identifying total coliforms, fitting copper pipes).

Successful agents are those who learn from their encounters and connect with as many technical paths as possible; each path increases the number of meaningful positions available to an agent within the games he or she plays, (e.g., 'I can read but I can't type', 'I like physics but I hate math', 'I know how to manage a PUC but I don't know much about chlorination'). There are many orders of reasoning, each with its own distribution of expectations, practicalities, common referents, and ideal goals.

Human agents are able to achieve goals using an infinite number of variable paths ('down to minutiae') such that one sometimes gets the impression of *Buridan's ass*, (1966) stuck between two adequately useful paths. There are certain points of decision where agents do not have an adequate choice, where the situation is vague and its problem uncertain. Confused agents must search for secondary signs (e.g., commentaries, suggestions, and rumours) that may weigh in the favour of one path over another (e.g., disputatious authorities, factions, familiars, and anonymous statements). At these aporetic points, inquiry begins.

Public Inquiry emerges along the fold between rumour and the institution of law. Rumour infects the flesh of inquiry, i.e., its *sense*: observations, testimonials and reports inevitably lead back to conjecture, approximation, guess-work, hearsay, and forgotten acts. Law stands like a skeleton, framing each disputant's claims: arguments must reference statutes, official guidelines, protocols, normal equilibria, and so forth, in order for inquiry to diagnose critical points of disorganization (e.g., did the PUC Manager know about 'Ontario's Drinking Water Objectives' and ignored them, or did the MOE fail to notify the PUC Manager of his duties?)

The 'Drinking Water Objectives', Chlorination Bulletins, and other guidelines of 'best practice' complicate the question of duty because they are 'not quite laws'; to further our corporeal metaphor of substantiation, guidelines and authoritative interpretations of law are vessels that stabilize tracts of sensory being, 'the skin of the world', around fixed points of law, translating constrained observations into conditioned verifications and *vice versa*. Thus, law attempts to escape interpretive historicizing by

evoking an inorganic eternity: e.g., 'safe water is pure water, free of influences, just H₂O... forever and ever'.

As a law unravels under the force of its tragic exposure (e.g., 'Walkerton proves we need tougher drinking water standards'), agents of the institution search out plausible variables that may have undercut their authorized causal network (e.g., 'We forgot about agricultural influences on ground water'). Thus, the Public Inquiries Act of Ontario institutes a *State* of plausibility that infiltrates every public institution within Ontario.

But unlike the decisions of other legal authorities, the Commissioner's judgement is partial; he cannot sort the indeterminate heap of causes and disputants into a neat sentence of propositions: during inquiry, the very language of dispute is fragmented by the compositions of multiple disputants and their disparate situations. The disputants of deliberate inquiry are not plaintiffs on one side and defendants on the other; accusations are probative, questioning and open to reassessments and retractions without recourse to a higher level of judgement. Public Inquiry emerges where law fails. As such, it does not have the authority to sentence. A Commissioner can only recommend and point others toward the direction of truth, where they must set their own verificationist procedures.

Implications:

I undertook this project to understand a crisis that singularly reconfigured the organization of Walkerton, Ontario. The crisis occurred after an unforeseen point of contamination in the town's water distribution system led to the death of seven inhabitants and the incapacitation of thousands. My assessment of the crisis concentrates on the Public Inquiry that ensued to contain it. Through a close reading of inquiry

transcripts and related policy documents I identified points of disorganization involving the water system's 'key players': e.g., MOE, PUC, Public Health Unit, Municipality, and town residents.

My analysis of the crisis and its Public Inquiry discloses Walkerton's water distribution system as a multi-phase organization dependent on the coordination of disparately situated agents: e.g., MOE officers and managers, the PUC Manager and his operators, the Mayor, the Chief Medical Officer of Health, Public Health Inspectors, doctors and patients, spectators, and witnesses. As these agents attempt to discover 'what happened at Walkerton', they each configure a specific domain of activity that traces back to a deliberate style of inquiry (cf. my analysis of the MOE, PUC and Public Health Unit's use of the simulation heuristic, pp. 175 – 177). Each domain specifies the partial perspective of an agent's experience: the situations she encounters, the games she plays, the positions she inhabits, and the laws she obeys.

I contend that an agent's domain emerges from a bidirectional information process: we begin with 'bottom-up' typification processes that situate her activity, then zoom out to examine how her 'top-down' anticipatory system of possible situations correlates with the expectations of other agents belonging to her organization (e.g., dynamic equilibria; Lewis 1969, Skyrms 1996).

I consider the network metaphor of domains that depicts this bidirectional model, a tractable method for translating microscopic agential activities into macroscopic organizational ideals, and *vice versa*. Moreover, a bidirectional model allows us to analyse the dialectical contradictions that propel an agent's inquiry through a metastable environment. Every analysis of inquiry rests upon some concept of problems (cf. Dewey

1938). But we cannot adequately conceptualize problems without a scheme that tracks their emergence after real situated constraints overturn ideal goal-oriented conditions.

In general, a domain frames an agent's perspective about a metastable environment. It systematizes tokens of formal recurrence and control that signify normal expectations and ideal conditions for targeting and stabilizing problematic situations along verifiable procedures of consistent operations. However, concepts of stability, consistency and verity define a locally bound system of procedures within the globally unbound or metastable environment (Simondon 1989). Zooming in on a given procedural system reveals increasingly finer operations that constantly shift the structural integrity of a situation until analysis encounters unconscious processes of emergent activity (e.g., affectivity, respiration, circulation, and perspiration).

Shifting focus from one range of operations and structures to another may also cross thresholds of domains. For example, an agent wrestling with the legality of a specific procedure often forgets the situation of his or her own body and may not be able to control nervous tension while concentrating on a legal domain that is currently ideal but affectively real. Thus, although a sensory range is an organism's actual workspace, multiple domains compete for and dominate its interface with environmental contacts at any given time (e.g., confusion entails a situation that partially satisfies more than one domain without any proving clearly dominant over environmental constraints).

To conclude, I propose three general themes in which the Walkerton crisis implicates inquiry and coordinated activity. These themes should be taken as pathways to further research and contemplation: 1) Coordinating organizations (e.g., the MOE and PUC) are capable of configuring shared information into conflicting domains. Moreover,

the ideal conditions of coordination (e.g., goal-orientation) are such that agents belonging to disparate organizations will not recognize contradictions if they over-generalize each other's information process and ballast exchanges around the mere appearance of coordination (cf. my analysis of the MOE's 'coarse grained' compliance policy in relation to PUC operations and 'fine grained' entities like E. coli O157:H7, pp. 158 – 160).

2) Communities reliant on the coordination of disparate organizations indirectly access certain technical domains through a share of 'common sense' (e.g. popular culture, folk science, and opinion). This common sense or consensus emerges from the generalization of multiple ontological domains (e.g., the 'do it yourself' chemical analysis of a Hach kit generalize physics, chemistry, and microbiology).

For example, only a few inhabitants of Walkerton experience the situations of a PUC operator (e.g., taking water samples, interpreting turbulence, and dispensing chlorine), but without such a technical domain, the majority of Walkerton's residents would be unable to verify their own expectations of the water distribution system (e.g., there would be no one to consult when 'tap-water situations' become uncertain).

Common sense provides a Walkerton resident with the reassurance that a trained (e.g., initiated) technician is open to the ontological domain of ground water systems. The technician, however, experiences PUC structures (e.g., chlorine levels, rates of flow, and wells) as modes of being within his own (technologically augmented) sensory range. Technologies are situation specific in that they determine procedural encounters between a technician and his or her environment. When technicians proceed through a situation with determination, they actualize a method of verifiable truth-procedures. Verifiable

methods rely on protocols to authenticate the technician's activity and authorize his or her manipulation of PUC structures (cf. my analysis of Lab technicians, pp. 82 – 83).

A Walkerton resident operates as if the water distribution system were completely determined by PUC technicians. This confidence in common sense is epistemological, not ontological, because a Walkerton resident does not directly experiment with the water distribution system but relies on the consistent relations that PUC operations establish. Ontology requires a sensory range through which to experience modes of being; epistemology supervenes upon existing ontological domains by converting their stock of situations into general expectations of determined and effective truth-procedures. Thus, residents know chlorination 'is necessary' without understanding its chemical structure. Of course, resident's act as witnesses to the PUC technician's effective truth-procedures (cf. my analysis of truth and plausibility, p. 172). So when crisis contradicts a resident's expectation of water, a new form of consensus must be negotiated through a system of plausible inference.

3) Despite the parallel distribution of an organization's situated agents, there exist indeterminate constraints that cannot be adequately rendered by coordinated domains. Indeterminate constraints express agonistic relations between systems of expectation within games of information exchange. They also maintain problematic situations in which multiple organizations share intersecting boundaries, contradictory objectives, and incompatible techniques. Thus, a procedural error is situation specific; it expresses the optimal limits (constraints of 'best fit') to which an agent's operations are bound at any given time. An optimal limit fixes an agent's current commitment to (and belief in) the domains that guide his or her expectation of procedural outcomes.

However, as situations occur in a metastable environment, an agent must update and revise his or her domains through a dialectical process of inquiry (e.g., experimentation; cf. my analysis of singularities and error, pp. 159 – 161). Optimal limits are experientially flexible and continually transform to allow an agent to operate within shifting situations. Consequently, an error simultaneously expresses a situation's limit and the possibility of its alternative. Mistakes express indeterminacy because they carry multiple outcomes, such that a failed procedure may satisfy some other situation or inform the design of future attempts (e.g., adaptation).

Appendix 1: Tabular Summary of Project

Chapter Heading & Levels of Analysis: <i>(Dominant Scope: Descriptive, Normative or Prescriptive)</i>	Domains: <i>(Dominant formal systems of possible situations)</i>	Organizations Involved: <i>(Dominant Players)</i>	Thematic Content: <i>(Dominant themes)</i>
Chapter 1: Crisis Descriptive. Normative	Tragedy. Unstable Opinions. Politics. Defense and Control. Art of Rhetoric	MOE. PUC. Public Health Unit. Walkerton Residents. News Media. Spectators	Tragic roots of inquiry. organizational discourse or how agents figure each other out. the sentence of formal systems and law's syllogism. decisions and games of coordination. problems with organizing disparate agents
Chapter 2: The Players Descriptive. Normative. Prescriptive	Jurisprudence (e.g., Ontario Legislation). Art of Rhetoric. Pragmatics. Game Theory. Negotiation. Discourse Analysis	Commission of Inquiry. MOE. PUC. Public Health Unit. Walkerton Residents	Legislated expectation and organized positions. pragmatics of law. the game of compliance. deliberate inquiry takes subjects beyond tragedy (i.e., figurations). figures and strategies that Commissioner will not tolerate
Chapter 3: Inquiry as Dialectical Process Descriptive. Normative	Science of Chemistry. Medicine. Sociology. Probability. Physics versus Metaphysics	PUC (e.g., operators). Walkerton Residents (e.g., patients). Non- human systems (e.g., E. coli)	Inquiry and human being. sensation and dialogical relations. physics/metaphysics. sampling events (e.g., how to practice chlorination). formulae and methods. pragmatics: between idealism and realism. dialectical aspects of inquiry. E. coli and social subjectivity
Chapter 4: Introducing a Body Descriptive. Normative. Prescriptive	Dialectics and its three phases. Ontology of human inquiry. Witnessing. Computer Science. Network and Systems Metaphors. Surveillance. Inspection and Repair	PUC (e.g., operators and expert systems). Public Health Unit. Spectators. Walkerton Residents. MOE	The body of activity. substantiation of evidence. understanding situations. observation and reportage. witnesses of law. spectators. transmission of evidence. SCADA and mechanisms. entities and causal networks. path of meaning. grammars of position

Chapter Heading & Levels of Analysis: (Dominant Scope: Descriptive, Normative or Prescriptive)	Domains: (Dominant formal systems of possible situations)	Organizations Involved: (Dominant Players)	Thematic Content: (Dominant themes)
Chapter 5: Two Labs Descriptive (with a 2 nd order model of the chapter's methodology). Normative	Rhetoric, General Chemistry, Microbiology, Technology and Community	Commission of Inquiry, A & L Labs, GAP Labs, PUC, MOE	Contests and deliberation, the Commissioner of Public Inquiry, incompatible ontologies, language of situations (e.g., tokens/types), metalanguage of domains (e.g., concepts/themes), situations (e.g., structures/operations) and procedures (e.g., operations/structures), inside a general lab, two kinds of technician (specialized/generalized), the community of techniques
Chapter 6: Encounters of Agency Descriptive, Normative, Prescriptive	Temporality, Cinema, Archivism, Activity theory, Anthropology, Economics of Information and values (e.g., tokens of procedural currency), Formal Logic, Pragmatics, Semantics and Syntax	Commission of Inquiry, MOE, PUC, Labs, Doctor/Patient relations	Aspects and the individuation of sense, archives and memory, ideal archive is cinematic, Commission archive versus MOE archive, modeling agency: proportions, accidents and technicity, causal networks, selfhood and evaluation, Public Inquiry's catalogue of agents, the Commission of Inquiry is like a Coroner, assessing causality during Public Inquiry, plans and pragmatics, affects and the structure of evaluation, fetish objects and procedural conditions, targets versus goals, the denomination of common referents, technology and judgement, heuristic principles, networks of plausible inference versus truth-procedures, beliefs and scales of representativity
Chapter 7: Coordination and Games of Exchange Descriptive, Normative, Prescriptive	Game theory, Corporeality, Public Management, Systems Metaphor of Singularities and Genera, Economics of Information, Pragmatics	MOE, PUC, Public Health Unit, Walkerton Residents	Common sense and dynamic world lines, replication and games, conventions and social contract, the general form of dynamic games, the will and organizational games, an analogy between games and body/mind problems, organizational emergence and correlated equilibria, inside the MOE: managers, officers and external relations, Ontario Public Service ideals, MOE's typification of E. coli, generic points set causal networks, experimentation
Chapter 8: Plausible Inference and Uncertain Networks Descriptive, Normative, Prescriptive	Jurisprudence, Waste Management, Gender, Art versus Science, Medicine, Public Health, Public Service, Public Utilities, Criminality, Heuristics, Computer Science	MOE, PUC, Non-human systems (e.g., animals), Labs, Walkerton Residents, Spectators, Commission of Inquiry	The sentence or formal system of truth and its organization, internal versus external relations, general model of Walkerton water distribution system, organizational disintegration, truth and plausibility, the gift of the sentence, simulation and causality, how MOE, PUC and the Public Health Unit simulated possibilities, rumour and the transmission of plausible reason, general formalisms, logical relations and eternal forms, heuristic principles: representativity, availability and anchoring, law versus paradox, syllogisms and aporia, provisional knowledge and the emergence of grammars, rumour and Public Health, human/non-human relations, excremental ontologies, isolating the cause of Walkerton's crisis, styles of reasoning: dialogical versus analogical information processors, Walkerton mothers, problems with rational anchor points, art and science: doctors integrate dialogical and analogical forms, law and causality, three legal distinctions: criminality, tort and Public Inquiry, perfection and the end of inquiry

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