



On Determinations of Causal Connection with Respect to Environmental Problems: Hume, Whitehead, and Hegel¹

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ABSTRACT: In relation to David Hume's statement that "it is an infinite advantage in every controversy to defend the negative" (*Immortality* 331), this paper argues against the potential instrumental exploitation of the unresolved Humean epistemological lacunae surrounding causality in order to discount determinations of the causal connection between ecological problems and human actions. Two particular case issues are analyzed: 1.) global warming and 2.) the "effects" of oil dumping on human health. To this end, the paper provides systematic philosophical examinations of Hume's, Whitehead's, and Hegel's respective standpoints on causality, with an emphasis on the contrast between the notions of empirically observable "necessary connections" and "separations." It further makes the case that by treating the Whiteheadian and Humean overall perspectives concerning causality as "moments" within a Hegelian dialectical framework, respectively, we may arrive at a balanced, three-fold "process" approach to making determinations regarding causal connection. Within this three-fold conception, on the one hand, Humean skepticism provides the motive power for rigorous scientific inquiry and for critical scrutiny regarding scientific hypotheses concerning environmental problems, in light of the potential overstatement of Whitehead's holism. On the other hand, Whitehead's position undercuts the potential employment of unmitigated Humean skepticism as a *Semmelweis reflex* in relation to any determination of a causal connection in respect to ecological problems and human actions. In accord with Hegelian manners of philosophizing, in virtue of the dialectical working out of these two moments, determinations

of causal connection stemming from scientific inquiry may proceed in a third, unifying moment. The paper raises a subsequent issue (dealt with in a note at the end of the essay): that Whitehead's overall cosmological scheme, in its overcoming of substance ontology, forces us to rethink traditional Aristotelian notions of causality in a more "process"-oriented and holistic way.

The problem of Humean skepticism in respect to determinations of causal connection concerning environmental problems

Unresolved epistemological lacunae have the potential to bear extraordinarily on contemporary issues in ethics, science, politics, and law. One particular instance concerns the enduring problems posed by Humean skepticism in relation to causality. Many prominent philosophers and scholars have taken up some of the challenges posed by David Hume's epistemology, including Alfred North Whitehead. Following from Whitehead's analysis of Hume's thought throughout his philosophical writings, a contentious scholarly dialogue on the issue of causality was advanced by J.W. Robson in his article, "Whitehead's Answer to Hume" and by M.W. Gross' "Whitehead's Answer to Hume: A Reply," both papers appearing in G.L. Kline (ed.), *Alfred North Whitehead: Essays on His Philosophy* (1963). Today, the "unresolved contention" between Hume and Whitehead respecting causality is particularly important in light of the need to make scientific determinations as to the existence and causes of global environmental problems, to be able to engage in practical action (*praxis*) in relation to such potential problems, as well as to hold those responsible for pollution, ecological damage, and their negative effects, if any, accountable. This is the case since skeptics and critics of environmentalism may potentially employ Humean skepticism or other similar perspectives in order to discount determinations of causal connection between environmental problems and human actions. As such, while it is to be noted that Humean skepticism may apply to any and all hypothetical determinations of causal connection whatsoever, and not merely those pertaining to ecological issues, it is clear that the contention regarding determinations of causal connection is not only an unresolved metaphysical or epistemological issue, but it is also one that potentially bears on the natural sciences, environmental ethics, politics, and law.

It is the purpose of this paper to assist the resolution of the contention between Hume and Whitehead regarding determinations of causal

connection in a theoretical and generalized way, with a focus on ecological issues. Overall, while my approach is emphatically Hegelian, namely, while it is based in Hegel's articulation of the three-fold dialectical unfolding of the logical Concept (*Begriff*), it offers room for both Humean and Whiteheadian perspectives as "moments" within it. As will be emphasized, it is not largely Hegel's standpoint with respect to causality, but rather it is Whitehead's epistemological and metaphysical insights which serve to counterbalance the challenges of Humean skepticism. At the same time, the standpoint I set out here seeks to maintain the critical nature of Humean skepticism within such an approach as conducive to continued scientific inquiry concerning the causes of environmental problems.

The Hume-Whitehead contention centers on the issue of the ability to make determinations regarding causal connection. On the one hand, unmitigated Humean skepticism is constituted by the argument that there is strictly no empirical basis for making determinations as to any necessary connection between putatively-stated "causes" and "effects." On the other hand, Whitehead's process-relational and speculative metaphysical scheme holds that the extensive continuum is itself composed of an indefinite multitude of causal nexūs, meaning that it is potentially divisible into "causes" and "effects." Whitehead's cosmology emphasizes the primordial relatedness of Nature, in which there is no empirical basis for the determination of any necessary separation between putatively stated "causes" and "effects." However, by treating both the Whiteheadian and the Humean positions dialectically, namely as "moments" within the "working-out" of determinations as to causal connection, we may approach a three-fold "process" standpoint on the issue, akin to a Hegelian stance.

In order to carry out this project, it will be necessary first to provide a brief synopsis of the Humean lacuna respecting the notion of causality. Second, I shall examine the issue of causality in respect to environmental issues by taking up two particular instances of contention: the first, involving the issue of global warming and the second, regarding oil dumping in Ecuador. Third, it is imperative to highlight the manner in which Whitehead interprets and analyzes Hume's epistemology. Fourth, I intend to outline Whitehead's critique of Hume's account of experience. Fifth, it is necessary to demonstrate how Whitehead's metaphysics of relatedness provides an imminent counter-claim to Humean skepticism regarding determinations of causal connection. Sixth, I will briefly examine Hegel's analysis of the concept of causality in the *Logic*. Seventh, it is imperative

to conceptualize how Hume's and Whitehead's respective standpoints may be treated as Hegelian "moments," as in the unfolding of the logical Concept (*Begriff*), offering a generalized way to resolve the contention concerning causality.

A brief synopsis of Hume's skepticism concerning determinations of causal connection

In *A Treatise of Human Nature* and *Enquiries Concerning Human Understanding*, David Hume inquires into the nature of causality and induction from an empiricist perspective. Hume's emphasis on empiricism revolves around the basic thesis that direct observation, as in immediate sense-perception, is to be taken as the primary element in the constitution of experience and in relation to the provision of evidence for truth claims. The central problem Hume identifies, which leads to his skepticism regarding the notion of causal connection, is that we do not empirically observe causal connections. As Hume claims, "*all our distinct perceptions are distinct existences, and that the mind never perceives any real connexion among distinct existences*" (*Treatise* 678). Thus, Humean skepticism emphasizes that there is no impression given to empirical perception of any necessary connection in relation to putatively stated "causes" and "effects," nor with regards to the conscious perception of distinct objects or events. In other words, there is nothing that one could empirically point to which is representative of the force or power implied in relation to a putatively stated "cause" and "effect." While Hume "hunts" for the impression of the "necessary connection" in his epistemology, he concludes that "no individual case of causation involving only objects that we perceive by our senses yields any impression of necessary connection" (Dicker 1998, 100-01). And, he adds that "when we look about us toward external objects . . . we are never able, in a single instance, to discover any power or necessary connexion, any quality which *binds the effect to the cause, and renders the one an infallible consequence of the other*" (*Enquiries* 63). As some neo-Humean interpreters suggest, without this tangible evidence of the force or object behind causality, determinations of causal connection stem from sources other than empirical observation. Furthermore, given that determinations of causal connection do not have any ground in empirical observation, unmitigated Humean skeptics conclude that causality itself is entirely inadmissible as a fundamental scientific concept.

Hume's own explanation of this lacuna is that it is our having experienced the constant conjunction of the two elements; for instance, our previous observation of instances in which smoke has accompanied fire, which underlies the notion of "necessary connection." In Hume's view, it is this habitual or customary conjoining of these phenomena together (e.g., past observances where smoke has accompanied a fire), and an expectation of a similar accompaniment, that is at the root of making determinations of causal connection. He states, "after a repetition of similar instances, the mind is carried by habit, upon the appearance of one event, to expect its usual attendant, and to believe that it will exist" (*Enquiries* 75) and that "we only learn by experience the frequent *Conjunction* of objects, without ever being able to comprehend any thing like *Connexion* between them" (*Enquiries* 70). For Hume, our sense of causality develops when we repeatedly experience occasions in which similar things, events, or phenomena accompany one another (i.e., "A" may be said to accompany "B," but "A" cannot be said to "cause" "B"). In other words, when one is occurring, the other is occurring, and nothing further can be said. For Hume, since there is nothing that we could point to, empirically, that is representative of the "causal connection" between smoke and fire, the appearance of smoke may be said to accompany the fire, but the smoke cannot be said to be "caused" by it.

In his analysis, Hume emphasizes that the notion of causality is caught up with experience of the contiguity in time and space. For example, fire is said to "cause" warmth merely because in previous experiences, the fire was accompanied by the warmth, and where, for the most part, the fire comes prior to a certain degree of warmth. The fire has a temporal priority over the warmth and is said to be the "cause" of the warmth. Of course, one must produce warmth through friction, for example, if one wants to start a fire. But, the experience of the constant contiguity in space and time between the two phenomena is part of the underlying operations and inferences of the mind by which we both determine and distinguish between the "cause" and the "effect." Effects are held to "follow" or "come after" their causes in space and time, but again, from the Humean perspective, there is nothing that one could point to that is representative of the necessary connection between the cause and the effect. The relationship is really that of a regularity of accompaniment and/or an enduring accompaniment, attributable to the recollection and/or memory of like A's and B's.

Hume further examines the mental operations underlying determinations of causality in respect to “new instances” of causality. When we were children, for instance, we first noticed that a feeling of warmth came over us when drawing near to a fire. There was nothing empirically observable which represented the necessary causal connection between the two phenomena, fire and warmth, and we had no understanding of their connection due to the fact that we had not previously experienced their conjunction. Thus, for Hume, the notion of “necessary causal connection,” as commonly conceived, is really an inflation of, and abstraction from the notions of constant conjunction and/or accompaniment beyond empirical evidence. Even observing the constant conjunction of smoke and fire on several occasions still gives us no warrant to suggest that the warmth is necessarily caused by the fire. From a Humean standpoint, we are only justified in predicting that warmth will accompany the fire, based on a generalization made from the recollection of past experiences and observations which resemble the contemporary one. This last point shows that skepticism of causal connections and skepticism of induction go hand-in-hand, and that the underlying mental operations by which we determine causal connections are also based upon another precarious faith that future like occurrences will be uniform with past ones. From this perspective, determinations of causal connection are instances of “inductive reasoning” in the traditional sense of making a generalization based upon an enumeration of particulars. Paradoxically, arguments about causality in which inferences are made about “necessary causal connections” are considered to belong to the category of inductive reasoning (as opposed to deductive forms), namely, in inferences grounded in conclusions which follow probably from the premises. In any case (since the scientific method pretends not to rely upon faith in the uniformity of Nature or the expectation that the past will be like the future, but rather solely upon empirical observation), here the unmitigated Hume seems to have delivered a knock-out blow to arguments and explanations concerning causal relations. One neo-Humean conclusion is that on the basis solely of empirical observation, we can say that nothing like what we really mean by causality ever actually occurs.

Accordingly, in view of the lack of anything to point to which is representative of the causal connection between phenomenon A and phenomenon B, for the unmitigated Hume, all inferences regarding causes are fallible. He states,

No inference from cause to effect amounts to a demonstration. Of which there is this evident proof. The mind can always conceive any effect to follow from any cause, and indeed any event to follow upon another; whatever we conceive is possible, at least in a metaphysical sense; but wherever a demonstration takes place the contrary is impossible, therefore, for any conjunction of cause and effect. (Hume in Dicker 1998, 71)

In sum, Hume's skepticism consists in the notion that determinations of causal connections are an abstraction from the mind's operations of conjoining objects and phenomena in light of our experience of the repetition, their contiguity in space and time, and the resemblance of certain types of occurrences. As will be elucidated in the next sections of this paper, today there is the possibility that critics of environmentalism may attempt to debunk hypotheses and claims concerning the causal origins of environmental problems along similar lines as those raised by Hume's skepticism.

Determinations of causal connection in respect to environmental problems: two contemporary examples

The word "environment" is derived from the Middle French for "surroundings," as in the natural surroundings or habitat humankind finds itself in. The prefix "eco-" of the word "ecological" is a Greek term, *oikos*, meaning "house"; for example, the habitats, the ecosystems, the places wherein species live, or the planetary biosphere, in general, which houses and supports life. Stemming from this etymology, a stipulative definition of an "ecological problem" is "any dysfunction in the biosphere that affects the capacity of ecosystems to maintain and/or to promote the survival and/or the natural evolution of existing forms as well as of future generations of organic life." It is held by the natural sciences that, like other phenomena, such "dysfunctions" are effects which have causes, conditions, and contributing factors. In general, ecological research in the natural sciences attempts to: 1.) discover potential and actual environmental problems, 2.) develop hypotheses regarding their causes and sources, 3.) determine the factual/truthful nature of such causes through experimentation and observation, and 4.) recommend solutions to such problems. Here, I discuss two environmental issues which call for inquiry into the determination of causal connections, which serve to help define the Humean problem concerning the notion of causality and the possibility of its employment by skeptics of environmentalism and critics of the ecological sciences.

Example #1: Determinations of the cause(s) of global warming

Scientific inquiry into the particular problem of global warming has been fraught with controversy, but not mostly from scientists themselves. Scientists point to the close correlation of carbon dioxide in the atmosphere and global temperatures in the past, as well as the dramatic rise of carbon dioxide in, or being emitted into, the atmosphere in the last one hundred years. There is a scientific consensus that global warming *is* occurring, as evidenced by an average increase in temperatures globally (on average 0.4 to 0.8°C since the turn of the 20th century). Scientists suggest that this recent rise in temperatures has had the effect of warming the oceans, affecting the most fragile, yet important, lifeforms in the food chain, such as plankton, on which many other species depend. Other phenomena that are commonly associated with global warming, as “domino effects,” are the melting of the polar ice caps, disappearing glaciers, and the thawing of permafrost in the north (which, in turn, is said to release vast amounts of methane into the atmosphere). It is speculated that the melting of polar ice may have the more immediate effect of cooling the world’s oceans, which threatens to upset the mix of salt and fresh water in the oceans. This may affect the global “oceanic conveyor belt” in an adverse manner, contributing to climate change and extreme weather conditions. Many scientists agree with the explanation that these increases are due to human actions, and in particular due to the burning of fossil fuels, as in the combustion of oil, coal, and gas, and in cement production. To differing degrees, scientists hold that global warming is caused by the operation of factories, power plants, incinerators, automobiles, trucks, and airplanes, which produce and emit “greenhouse gases,” such as carbon dioxide and methane, into the atmosphere, trapping the solar rays responsible for the natural heating of the Earth, much like a blanket does. While these gases are natural to the atmosphere, and without them it is estimated that the Earth would be over thirty degrees colder and entirely unresponsive of life, according to many scientists it is the human-induced increase that is accelerating global climate change. Human beings release billions of tons of carbon dioxide per year into the atmosphere. While approximately one-half of all greenhouse gases are absorbed by the oceans and the Earth’s forests, the remaining greenhouse gases are added into the atmosphere. Projections are that global temperatures will increase by 2.0 to 4.5°C by the year 2100, leading to droughts and the destruction of marine ecosystems, and will eventually affect and/or threaten the survival of all lifeforms on

the planet. The Kyoto Protocol of 1997 was an attempt on the part of nations to curb emissions of greenhouse gases, especially carbon dioxide, and to reduce them initially to 1990 levels. Even though countries such as Canada have signed this agreement, it is estimated that as of 2005-2006, Canada's emissions of greenhouse gases have risen anywhere from 24% to 30% compared to 1990 levels.

In contrast, skeptics of environmentalism and of the scientific claims surrounding global warming have adopted a multitude of standpoints on the issue. Some have either postulated that it is an unproven phenomenon, questioning the very legitimacy of the hypothesis that global warming is occurring, or they attempt to point out that since there is controversy, it has not been proven conclusively that it is occurring, as in a one-to-one causal correlation. Others downplay it as something that human actions contribute to, but are not responsible for, or as a natural occurrence caused, for example, by a cycle of shifting ocean currents which we cannot do anything about.² From this perspective of apparent scientific inconclusiveness, skeptics impel us, as citizens, to remain complicit with the *status quo*, namely, to not make change, but rather to simply maintain the existing socio-economic order. Until the 2006 State of the Union Address, it appeared that former Texas oilman, President George W. Bush, did not believe in the science establishing global warming as occurring. There is not much evidence to suggest that he fully believes it now, having dismissed the U.S. Environmental Protection Agency, which published a report stating that human actions are the causes of global warming, as "the Bureaucracy."³ It might be speculated that Bush's announcement of recent investments to further research into bio-fuels to be mixed in with gas may simply be a measure to keep oil corporations "on top," because, as some environmentalists claim, the bio-fuels proposed are an inefficient option, requiring large amounts of energy to produce them. Other public American icons like Jerry Falwell stated in 2002 that global warming is propaganda "created to destroy America's free enterprise system and our economic stability" (Little 2005). Falwell then urged everyone to go out and buy an SUV. In any case, it is clear that powerful right-wing forces in America are grasping for anything which could serve to do away with the findings of scientific studies concerning environmental problems. In North America governmental-corporate partnerships are the norm, and it is not a rare occurrence that governmental reports regarding the science behind global warming are edited by non-scientists who are on the

payroll of private corporations. So it is not so far-fetched to think that unmitigated Humean skepticism concerning causality might eventually be employed.

Among popular critics of environmentalism, figures such as Bjorn Lomborg (2001) whose book, *The Skeptical Environmentalist*, is a best-seller, argue that environmental problems, such as global warming, may be occurring and are bad, but they are not as bad as some scientists claim. For Lomborg, they do not require the worry, nor do they warrant the “Litany-attitude” of Al Gore and other environmentalists. And, he claims, it is by continuing with the existing global socio-economic order that we will become ever-more wealthy, and that we will eventually be able to afford to pay for the resolution of any ecological problems which might exist (*Skeptical* 350-52). Since the publication of his book, Lomborg has been accused of scientific dishonesty by a scientific committee in Denmark, accusations that were later withdrawn. Critics of Lomborg’s book claim that to not act on the hypothesis that global warming is occurring due to human actions, and to arrest the rate of fossil fuel and energy consumption, we risk “fiddling” while the capacity for the planet to sustain life is placed in jeopardy. They also question the fact that many of the people who stand against acting on the hypothesis that global warming is occurring due to human actions do not do so truly from an objective, scientific perspective, but rather stand the most to gain economically from maintaining the *status quo* of fossil fuel and energy consumption.

It might be speculated that many critics of environmentalism choose to ignore potential ecological problems largely on the basis that to commit to serious environmental action would threaten current levels of economic growth and human well-being. In any case, regardless of these popular skeptical attitudes concerning environmentalism, logically, skeptical contentions which directly concern the notion that the cause of global warming is to be found in human actions (e.g., the burning of fossil fuels) can originate from several basic perspectives. First, they may be associated with doubt that global warming is occurring (i.e., skepticism of the actuality of the putative effect). Second, such skeptical claims may originate from doubt that global warming is chiefly caused by human actions, especially by way of the burning of fossil fuels (i.e., skepticism of the actuality of the putative cause). Third, they can arise from both doubt that global warming is occurring (skepticism of the actuality of the putative effect) and doubt that burning fossil fuels has

any significant environmental effect (skepticism of the actuality of the putative cause). Fourth, such skeptical claims can come from a lack of an empirically observable necessary connection between human actions (e.g., the burning of fossil fuels) and global warming and/or a disbelief that anything like causality actually occurs (i.e., as in unmitigated Humean or neo-Humean skepticism). This last possibility could be considered the most radical, and may involve a complete disbelief in the natural sciences. In light of the fact that the Humean lacuna concerning causality has not yet been “thoroughly resolved,” one may easily imagine that unmitigated Humean skepticism concerning causality might be employed as in a *Semmelweis reflex*, or as a strategy to refute the claims of environmentalists and scientists concerning their determinations of causal connection in regards to global warming. To be sure of this possibility, Hume once made the claim that “it is an infinite advantage in every controversy to defend the negative” (*Immortality* 331). Nevertheless, in light of the potential catastrophes resulting from global warming, Hume’s statement that the complete skeptic (i.e., a Pyrrhonian) “must acknowledge . . . that all human life must perish, were his principles universally and steadily to prevail” (*Enquiries* 160) takes on new meaning.

Example #2: Determinations of the causal connection between the rise in cancer cases among Ecuadorian villagers and the dumping of oil waste

A second example concerning the issue of determinations of causal connection is in respect to human health consequences as a result of ecological damage. One recent case that has received some news attention involves a six-billion dollar lawsuit filed on behalf of Ecuadorian Aborigines and villagers against Chevron Texaco in 2003, as a result of the possible health effects of oil-waste dumping by Texaco Petroleum Company operations in Ecuador from 1964-1990. The lawsuit alleges that, during this time, Texaco dumped approximately 18.5 billion gallons of highly toxic oil byproducts into hundreds of open pits in the Ecuadorian Rainforest, which contaminated rivers and streams as well as the drinking, bathing, and cooking water of local inhabitants.

According to the “Yana Curi” Report (2000), which was released by the plaintiffs, the oil dumping allegedly caused a dramatic increase in cancer and leukemia cases, more than twice the expected rate among the inhabitants of the region. In addition to the “cancer cluster” that exists among the population, the pollution also allegedly caused crop damage, devastated

the ecosystem's biodiversity, killed off many farm animals, and disrupted the traditional aboriginal way of life in the region. The plaintiffs also claim that Texaco used production methods that would have been prohibited in other countries. They claim that Texaco did not clean up the "spills" (or the alleged dumping) adequately, and that the corporation did not adhere to responsible environmental practices, such as re-injecting waste deep into the ground, a practice carried out in most other countries. Environmentalists estimate that Texaco reaped thirty-billion dollars in profits from its operations in Eastern Ecuador, cut corners in order to maximize profits, and viciously exploited that developing country's natural resources. All the while, Texaco carried an agreement with the Ecuadorian government freeing them from ever being sued by it. But it has been argued that the people affected by Texaco's operations never took part in the negotiations, and that the government essentially had stood against the interest of its citizens. In any event, it might seem that the plaintiffs have quite a strong case against Chevron Texaco, and that it is only a common-sense notion that a causal connection could be established between the placement of the oil pits and the rise in cancer cases. However, Chevron Texaco, its lawyers, and many scientists and experts who are "onside" with the multinational corporation, have consistently rebuffed the charges. They claim that the health assessments and reports put out by the plaintiffs are not conclusive and that the soil and water in the area are contaminated by agricultural waste-products, pesticides, and sewage, as well as the oil operations of Petroecuador, which took charge of the state's oil resources in 1992. Specifically, a Texaco spokesman stated:

there is no indication of any adverse health impact on the residents of the Oriente that can be linked to (Texaco's) oil production activities. But they have a very serious problem with regard to the lack of proper hygiene and proper infrastructure, and we are sympathetic with that, but we do not accept that we are responsible for this situation.⁴

Here are some excerpts highlighting the expert comments in defense of Texaco, from a lengthy press release dated February 2, 2005:

Experts Say Health Studies Promoted by Lawyers and Activists are Flawed, Biased, and Inconclusive.

No Connection Between Health Problems in the (Ecuadorian) Oriente and Texaco Petroleum's Past Oil Activities. Poor Sanitation, Insufficient Medical Care, Malnutrition and Use of Pesticides are More Likely

Causes of Health Problems. Promoters of Lawsuit Against Chevron Texaco Conveniently Ignore Facts.

“Chevron Texaco invited some of the world’s leading epidemiologists and medical and scientific experts to review the various studies that the plaintiffs have been promoting,” said Dr. Ken Satin, Staff Epidemiologist for Chevron Texaco Energy Technology Company. “Each of these experts independently reached the same conclusions: the studies are both flawed and biased, and none of them establish a credible link between oil exposure and the alleged health problems of the region. In fact, the plaintiffs’ lawyers promoting these studies conveniently ignore the fact that in many instances the studies’ authors acknowledge they do not establish a link, and they also ignore the other non-oil related factors that have been shown to cause the health problems raised by the plaintiffs.”

Dr. Alvaro Felipe Davalos Perez, expert in tropical medicine: “there is no clear evidence that proves oil and its derivatives are a direct cause of risk of cancer.”

Dr. Lowell Sever, Professor of Epidemiology, University of Texas, Houston: “There is little or no evidence that would support a causal relationship between oil contamination and health effects.”

Dr. David J. Hewitt, Director of Occupational Health Services for the Centre of Toxicology and Environmental Health, Little Rock, Arkansas: “A causal relationship between living near areas of oil exploration in Ecuador and health conditions such as adverse pregnancy outcomes and cancer cannot be supported based on an inability to satisfy basic criteria for establishing causation. These deficiencies include:

- health effects which are not consistent with known health effects of the reported chemicals;
- incomplete exposure assessment;
- no objective verification of exposure or magnitude (dose-response) of exposure in study participants;
- significant methodological problems in health studies which preclude any type of causal conclusion;
- other potential causes for reported health effects were not reliably excluded.”

Ricardo Reis Veiga, Vice-President General Counsel, Latin America Products for Chevron Texaco: “These analyses, when taken together with the results of the initial site inspections which have shown no

harmful levels of oil-related contaminants in soil or water, establish beyond a doubt that there is absolutely no validity to the allegations made in the lawsuit that suggest a link between health problems in the region and Texaco Petroleum's past involvement in the oil consortium. . . . *There is no indication of any adverse health impact on the residents of the Oriente that can be linked to oil production activities, but they have a very serious problem with regard to the lack of proper hygiene and proper infrastructure and we are sympathetic with that but we don't accept that we are responsible for this situation.*

"If the (Plaintiffs') lawyers were truly concerned with the well-being of the people of the (Ecuadorian) Oriente, they would encourage the government of Ecuador to address the basic public health and socioeconomic problems facing the region."

There is No Credible Evidence Linking Exposure from Oil Operations to Health Concerns.

Reports claiming that historical impacts from Texpet's operations have caused high incidents of various diseases, including cancer. However, these studies have been widely discredited by leading health experts. Further, while no link has been established between exposure from these oil operations and the reported health problems, there is a significant body of evidence suggesting that other factors—including high levels of bacteria in surface and groundwater sources from human and animal waste, widespread use of pesticides, malnutrition and insufficient access to medical care—are likely contributors of the region.

Independent Medical Experts Categorically Refute Validity of Individual Health Studies Promoted by Plaintiffs

Dr. Laura Green, Toxicologist, Massachusetts Institute of Technology: "(The plaintiffs' report) is not a scientific study of environmental effects. . . . This procedure bears little resemblance to an epidemiologic study. . . . This 'study' lacks the central characteristic of any scientific inquiry, which is **skepticism** regarding the explanation of the observations."

Dr. Miguel San Sebastian and Dr. Anna-Karin Hurtig: "There is a notable absence of balanced criticism that one would expect to find in a reasoned scientific assessment. . . . These authors have not even mentioned any alternative theories to explain the (geographical-health) differences that they report, making it seem that their role is closer to that of advocate than of a skeptical scientist. Their arguments in favor of a causal interpretation are weak. . . . The most striking

problem with this paper is that the authors have completely neglected consideration of competing explanations for their data.”⁵

From these passages, it is evident that it is precisely the issue of providing empirical evidence for the “causal connection” or a “sufficient causal link” between the dumping of oil into pits, and the increase in cancer cases of persons living nearby, as a one-to-one correlation is of essence in this legal dispute. Similar to the claims made here, by positing an immediate rejection of any and all determinations of causal connection, Humean skepticism could potentially be employed in defense of those being accused of causing ecological damage. It is to be noted that none of the experts above define what they mean by “causal connection” in their critiques, nor do they suggest (in any thorough way) what kinds of evidence would warrant such a necessary connection. Furthermore, as some of the critical comments on the plaintiffs’ environmental reports above suggest, skepticism is characterized as an intrinsic part of serious scientific study.

In respect to the seemingly heavy-handed statement above that expert scientists “categorically refute” the plaintiffs’ claims, this itself implies a scientifically verifiable truth claim of an “absolute non-correlation” between the placement of oil pits and the dramatic increase in cancer cases. Here it might be said that the same scientific skepticism and disinterest applied to the consideration of the claims of the plaintiffs does not appear to apply to the defendants’ truth claims. Also, the notion of “categorical refutation” seems to indicate that absolutely conclusive evidence has been provided to support a complete disconnection of the two factors, rather than merely casting doubt upon the plaintiffs’ claim. A distinction must here be made between the “casting of doubt” and an “absolute refutation.” “Casting doubt” or an expert expressing a contrary point of view, whether or not there is substantive evidence for such doubt, does not represent an “absolute refutation” of a truth claim. Absolute or categorical refutation would seem to imply the notion that it has been scientifically proven that the dumping of oil waste did not cause the cancer. Nevertheless, we must remember that in legal cases, the correlation between the two factors must be “proved beyond a reasonable doubt,” where claims of absolute non-correlations which promote doubt are not usually at issue. Quite possibly, this represents a “grey area” in legal conventions, where the burden of proof (especially about the “causes” of phenomena) is one-sidedly the burden of the plaintiff, while the denials and negative claims of the

defendants are largely immune from such critical and scientific scrutiny. Here, reason is in service of litigation, namely, in representing interests of the parties, instead of finding out the truth regarding any and all of the truth claims waged. Because they are treated as the “critical negative” to the positive allegations and claims of the plaintiffs, and not as truth claims in themselves, the latter do not also need to be proved beyond a reasonable doubt, but merely are seen to have the purpose of casting doubt upon such accusations. In other words, it is only the truth and falsity of accusations and allegations that conventionally count in the outcomes of legal cases, and not the truth and falsity of critical negative claims and statements of denial (i.e., “not” statements). However, as will be alluded to in later sections of this paper, both Whiteheadian and Hegelian perspectives would perhaps challenge these legal and logical conventions requiring that the burden of proof be placed solely on claims determining causal connection, rather than on truth claims casting doubt upon them.

Ideally, legal cases should be an occasion for parties to arrive at the truth, where litigation is secondary. But, unfortunately, in current legal systems, concern for litigation and accountability are primary, where inquiry into the truth or falsity of all claims waged in respect to the reality of phenomena, including “not” statements, is secondary. It is easy to dismiss claims as to determinations of causal connection, while on the contrary, it is extremely difficult to prove them, and Hume has given us a seemingly irrefutable skeptical formula for dismissing any determination of causal connection, whatsoever. Consequently, legal conventions surrounding where the burden of proof lies stand in the way of the legitimate prosecution of truly neglectful corporations for environmentally destructive actions, pointing to the need for structural reform of the norms of law.

On this note, since the discounting of the scientific methods of the Yana Curi report by Chevron-Texaco experts, another report, “How Chevron’s Sampling and Analysis Methods Minimize Evidence of Contamination,” by Dr. Ann Maest, has been released. It takes issue with Chevron’s own science, arguing that:

Chevron’s hired technical experts are using a sampling and analysis program that meets neither minimum U.S. EPA guidelines nor the requirements of basic common sense. In several respects, the sampling practice of Chevron’s experts appears designed specifically to avoid finding contamination that would otherwise be obvious to any neutral technical expert.

The report charges that:

- Chevron collects soil samples locations that are selected to avoid contamination;
- Chevron's water sampling program lacks the necessary site-specific analysis;
- Chevron's "compositing" of soil samples misses hotspots and violates U.S. EPA guidance;
- Chevron uses an inappropriate laboratory test;
- Chevron ignores the importance of the lack of institutional controls;
- Chevron Misapplies U.S. EPA Guidance And Invents Norms With No Basis In Law.

To avoid facing its environmental legacy in Ecuador in this litigation, Chevron has used a sampling and analytical approach that severely minimizes the extent, degree, and toxicity of the contamination that still exists in the former concession area. In addition, Chevron is aggressively attacking the credibility and integrity of those who seek to scientifically document the negative health impacts of the failed remediation effort.⁶

But the counter-claims which are set out here can only be considered as secondary to the case. The causal connection between oil pits and the increase in cancer cases must be proved by the plaintiffs beyond a reasonable doubt, while the causal separation between them, as postulated by the defendants, does not need to be proved.

Another issue pertaining to the case and to medical science in general is that there has perhaps been a longstanding lack of both awareness of, and medical focus on, the notion that disease is not just a phenomenon occurring internally to the human body, and correspondingly is not merely something to be treated internally, but rather it is potentially caused by environmental factors (i.e., the body functioning in and participating in the composition of the environment). Interestingly enough, at several Chevron-Texaco stations in the United States, a warning that long-term exposure to gasoline vapor has caused cancer in laboratory animals appears at the pumps (*Material Safety Data Sheet: Regular Unleaded*).

Here, we might take research determining a causal correlation between smoking and cancer as loosely analogous to the Ecuadorian case. It was only in virtue of a "mountain" of scientific evidence, cumulated over thirty years in the late 20th century, which strongly posited a causal correlation

between smoking and lung cancer, that cigarette manufacturers were finally held legally responsible in North America. It must be said that in relation to global environmental problems, such as global warming and ozone depletion, in thirty years' time, based on current projections, the human species will probably have well-passed the ecological tipping point signaling the imminent collapse of the planetary life-support system, if we have not already done so. In relation to the serious environmental issues that confront us and the scientific determination of their causes, many environmentalists have pointed out that the human species does not have thirty years to act before irreversible damage to the biosphere will have occurred.

The point I am trying to make is not that we should give a blank slate to either accepting any and all hypotheses regarding determinations of causal connections respecting ecological problems and human actions, but rather to arrive at a balanced perspective respecting skepticism and the notion of causality. Such a perspective would be conducive to authentic scientific inquiry into the causes of environmental problems, but at the same time, eliminative of false or "less relevant" causal factors. In relation to the case study, it must further be pointed out that a court judgment in favor of providing monetary damages to the Ecuadorian plaintiffs is not a resolution to environmental problems. Rather, it would serve only to make neglectful multinational corporations consciously aware of the effects that their actions have on the environment and the health of the inhabitants of regions where they operate, using the "language" of money, which they most certainly understand. The case between the inhabitants of the Ecuadorian rainforest versus Chevron Texaco is currently still at trial in an Ecuadorian court. Because of a New York court ruling in the 1990s won by a plaintiff lawyer, Cristobal Bonifaz, the ruling and the damages would stand in the United States.

Whitehead's interpretation of Hume

Throughout his philosophical corpus, Whitehead pays tribute to Hume's philosophical rigor and clarity of expression. Whitehead states that "we must reverence (Hume) as one of the greatest of philosophers" (*SB* 52) and that "Hume is a writer of unrivaled clearness" (*PR* 130). While Hume is generally considered to be a skeptic, his writings essentially ended up revolutionizing the sciences, in terms of advancing methods of inductive reasoning. Hume's writings also heavily influenced Whitehead's thought.

Correlating with his own philosophy, Whitehead writes, “Hume’s train of thought unwittingly emphasizes ‘process’” (*PR* 140). Furthermore, Hume’s analysis of causes and effects considered them as “events” and not simply objects,⁷ and he anticipated a possible critique of the metaphysical notion of substances in ancient philosophy which was thoroughly carried out by Whitehead.⁸ These last points are perhaps lesser-known aspects of Hume’s inquiries and will be taken up in the next section of this paper.

Whitehead goes to great lengths to analyze and address Humean skepticism regarding causality and induction in outlining his own metaphysical scheme. To begin with, Whitehead states that his speculative scheme is emphatically “pre-Kantian.” In part, this means that he agrees with many of the insights provided by Hume, and he attempts to re-frame them. In other words, Whitehead’s intention is to address directly the problems to metaphysics and epistemology posed by Humean empiricism and skepticism, rather than following along the path of thought offered by Kant and the later idealists. In contrast to the metaphysical and epistemological accounts of causality of the “Kantian” variety, it might be suggested that Whitehead provides an analysis of experience which does not rely on reference to *a priori* ideas (causality being one), but at the same time, he does not embrace the sensationalist presuppositions and the skepticism of the empiricists. Instead, Whitehead’s own “provisionally realistic” account, as set forth in Part III of *Process and Reality*—“The Theory of Prehensions”—resides “between” Hume and Kant. On the one hand, Whitehead maintains the Humean empiricist notion that “direct experience is infallible” (*SB* 6) and that the metaphysical abstractions with regards to what is true are fallible. Against Kant and the idealists, Whitehead also staunchly defends Hume’s chief principle that “we can never conceptually entertain what we have never antecedently experienced through impressions of sensation” (*PR* 242),⁹ or in his own philosophical terminology, through antecedent physical feelings and experience. On the other hand, Whitehead does justice to the idealistic perspective in emphasizing how the creative and self-realizational processes of organisms belong to the basic constitution of the evolution of the universe. As depicted by way of his theory of prehensions, it is through the ongoing process of prehending the data of experience that organisms, in turn, appropriate and gather the elements necessary for their self-realization. Hence, overall, Whitehead synthesizes realism and idealism in his “provisionally realistic” system.

Whitehead has quite a “pragmatic” interpretation of Hume’s philosophical writings in respect to the problems and paradoxes they raise. He observes that even though in many cases Hume tends to “deny the rationality of science . . . some variant of Hume’s philosophy has generally prevailed among men of science” (*SMW* 4). To this extent, part of the modern scientific method involves an adoption of a disinterested epistemic attitude, which ensures objectivity by approaching all knowledge claims with a moderate degree of skepticism in the Humean sense. Hume’s empiricist emphasis on providing concrete and directly observable evidence for knowledge claims was also adopted by the natural sciences, and it is in this sense that Hume’s skeptical investigations of induction, in fact, ended up revolutionizing the scientific method. However, while Hume’s empiricism has provided modern science with a rigorous foundation for its methods, many of the metaphysical and epistemological problems he raised concerning causality and induction have all but been ignored by the natural sciences. The natural sciences have embraced the mitigated Hume’s “progressive” empiricism, but have not, for the most part, sought to embrace the radically skeptical elements of the unmitigated Hume’s philosophizing. As Whitehead describes, the natural sciences have “remained blandly indifferent to (their) refutation by Hume” (*SMW* 16).

For the most part, Whitehead’s own philosophical examination of Hume’s writings emphasizes a mitigated and/or “constructive” Hume, whose epistemological edifications have served to revolutionize philosophy and science, rather than concentrating on the unmitigated, radically skeptical, and/or “destructive” Hume, who serves to diminish it. Whitehead believes that “it is a great mistake to attribute to Hume any disbelief in the importance of the notion of ‘cause and effect’” (*PR* 133). Instead, he chides “Hume’s followers” and the pleasure that Hume’s doctrine regarding causality brings to them, rather than to Hume himself, for their rigid applications of Hume’s standpoint. To be sure, Whitehead states that “Hume differs from the great majority of his followers by the way he faces up to the problems raised by his own philosophy” (*PR* 136) and that “Hume’s followers have (potentially) misinterpreted Hume’s final position” (*SB* 51-52; also see *PR* 316), possibly employing Hume’s skeptical negativity in an instrumental manner to further their own ends. Potentially, these same criticisms might apply to those aiming to use Humean or neo-Humean manners of reasoning to debunk all determinations as to the causal connection between human actions and environmental problems. In this

sense, Whitehead's position is very similar to that of recent scholarship which has proposed to interpret Hume from a "New Humean" perspective. This standpoint holds that Hume did not himself disbelieve in causal connections, but rather emphasized that there was no empirical evidence to support such a notion, and that it cannot be affirmed from a strictly empiricist perspective. From the "New Humean" perspective, recent scholars have "emphasized (the) constructive, naturalistic side of Hume's thought, and de-emphasized its skeptical side" (Dicker 1998, 75).¹⁰

The "New Humean" interpretation holds that Hume's criticisms of causality are meant to debunk the notion that there is a causal principle knowable prior to experience, as the rationalists did. From this perspective, Hume is seen as taking issue with incorrect or inflated conceptions of causality, of setting out how we really come to assert causal connection, as well as of being critical of loose and unfounded claims about causality, but not as disbelieving in it. Furthermore, the "New Humean" perspective emphasizes that Hume merely sought to point out that determinations of causal connection are derived from abstractions and generalizations from simpler notions. It is not that causality should be discounted altogether, but rather that what we mean by causality really involves the ideas of constant conjunction, contiguity, the temporal priority of the putative cause, and the repetition of the accompaniment of the two substances or events. There is some textual evidence to support the notion that Hume was a constructive philosopher with respect to causality, rather than being a mere skeptic, especially since Hume establishes eight "Rules by which to judge of causes and effects" in Book I, Section XV of the *Treatise*. These rules, which are expressions of his previous arguments, serve to discriminate "true" claims regarding causality, from "false" ones. Regarding the "different faces" of Hume, one can only speculate what Hume would think or say in regards to skepticism of determinations of causal connection regarding environmental problems, if he were alive today.

Whitehead's critique of Hume's account of experience

While Whitehead stated of Humean skepticism that he could not "hope in any essential way to remove the difficulties which encompass (the problems of induction and causality)" (*ESP* 100) and did "not conceive of (himself) to have solved the difficulty which puzzled Hume," he did "wish to point out the general direction in which . . . the complete solution will be found" (*ESP* 108).¹¹ On the whole, Whitehead dedicates himself to analyze and to

demonstrate the shortcomings of unmitigated Humean skepticism, but he is not interested in defending reductionist or simplistic notions of causality. While throughout his writings Whitehead does employ Aristotelian concepts (which assume a substance ontology), such as “efficient causation,” his overall speculative scheme forces us to rescue some more holistic notion of causality from the grip of scientific reductionism.

In commencing his analysis of Hume’s epistemology in *Process and Reality*, Whitehead holds that “Hume’s difficulty with ‘cause and effect’ is that it lies ‘beyond the immediate impressions of our memory and senses.’” In other words, this manner of connection is not given in any impression” (PR 134). Again, by this he means that there is nothing that one could point out empirically that is representative of the “necessary connection” between a putative cause and a putative effect. But by wrestling with Humean skepticism, Whitehead provides an alternative to the Humean account on several interconnected fronts.

In arguing for his own theory of perception, involving the perceptive modes of causal efficacy, presentational immediacy, and symbolic reference, Whitehead charges that both Hume and Kant wrongly presupposed that presentational immediacy was the chief mode of perception and that they further assumed that it involves conscious experience. Correspondingly, Whitehead characterizes that Hume’s task of attempting to observe the necessary connection between “cause” and “effect” is problematic in that “consciousness only dimly illustrates the prehensions in the mode of causal efficacy, because these prehensions are primitive elements in our experience” (PR 162). While for Whitehead “Hume’s demand that causality be describable as an element in experience . . . is entirely justifiable,” the problem is largely a metaphysical one and requires a description “of experience [such] that . . . intuitions [of inheritance and memory] may be included” (PR 166-67). It is for this reason that Whitehead constructs his own three-fold theory of perception. In respect to his own distinctions regarding perception, substituting his own notion of actual entities for the notion of substances, Whitehead summarizes Hume’s position as follows:

Hume’s polemic respecting causation is, in fact, one prolonged, convincing argument that pure presentational immediacy does not disclose any causal influence, either whereby one actual entity is constitutive of the percipient actual entity, or whereby one perceived actual entity is constitutive of another perceived actual entity. The conclusion is that, in so far as their disclosure by presentational

immediacy, *actual entities in the contemporary universe are causally independent* of each other. (PR 123, my emphasis)

By contrast, Whitehead makes the case that causal efficacy, which does not necessarily involve consciousness, but rather involves feeling, emotions, and bodily experience, resulting from the direct causal impact and “inflow” of things in our environment on us, is the primitive mode of perception, consciousness being derivative from feeling. He argues that feelings and “emotions are accompanied by the clearest recognition of other things reacting upon ourselves” (SB 45), which further points in the direction of the theory of prehensions. Whitehead’s metaphysics holds that whether they are consciously aware of it or not, “all organisms have experience of causal efficacy whereby their functioning is conditioned by their environment” (SB 5).

In Whitehead’s account, Hume wrongly assumed that “our behaviour presupposing causation is due to the repetition of associated presentational experiences” (PR 174), and that therefore he was content to defend the dogma that, for instance, there is no impression of any necessary connection between a flash and the man’s accompanying blinking. However, such examples of visceral and spontaneous feeling provide Whitehead with evidence for perception in the mode of causal efficacy, and they confirm that “our bodily experience is primarily an experience of the dependence of presentational immediacy upon causal efficacy” (PR 176). He further adds that while Hume expressed

that sense-perception of the contemporary world is accompanied by perception of the ‘withness’ of the body . . . it is the ‘withness’ of the body that makes the body the starting point for our knowledge of the circumambient world. We find here our direct knowledge of ‘causal efficacy.’ (PR 81)

Here, Whitehead charges that even while Hume noted that the “withness of the body” belongs as part of the empirical data of immediate experience, in his “theory of direct perceptive knowledge [Hume] dropped out this withness of the body and thus confined perception to presentational immediacy” (PR 81).

Elsewhere, Whitehead claims that Hume assumed causality in his account of perception. In relation to Hume’s example of the flash allegedly making a man blink, for Whitehead, a flash did indeed *cause* the man to blink, rather than being explained from a Humean perspective as a curious “habit” of the man to blink after a flash. Whitehead states

that Hume's notion of "habit" was left unexplained in terms of impressions, with causality having to be explained in terms of impressions.¹² In Whitehead's analysis, Hume presupposes causality in his analysis of the role of the sensory organs in the acquisition of sense-data. In support of his own position, Whitehead points to the fact that Hume writes,

'if it be perceived by the eyes, it must be a color; if by the ears, a sound; if by the palate, a taste; and so of the other senses.' Thus, in asserting the lack of perception of causality, he implicitly presupposes it. For what is the meaning of 'by' in '*by* the eyes,' '*by* the ears,' '*by* the palate'? His argument presupposes that sense-data, functioning in presentational immediacy, are 'given' by reason of the 'eyes,' 'ears,' 'palates' functioning in causal efficacy. . . . Hume's argument first tacitly presupposes the two modes of perception, and then tacitly assumes that presentational immediacy is the only mode. (*SB* 51)¹³

It is along this line of reasoning that Whitehead provides a thorough account of this feeling-based and emotion-laden bedrock of experience, which only rarely involves consciousness, in the theory of prehensions. For Whitehead, Hume's notion of an "impression of sensation" itself assumes perception in the mode of causal efficacy, while at the same time, he refuses the notion of causal connection. Hume similarly emphasizes the need for evidence, but essentially, in Whitehead's terminology, from the perspective of perception in the mode of presentational immediacy. Therefore, Whitehead charges in respect to Hume's analysis of experience,

we have here a perfect example of the practice of applying the test of presentational immediacy to procure the critical rejection of some doctrines, and of allowing other doctrines to slip out by a back door, so as to evade the test. The notion of causation arose because mankind lives amid experiences in the mode of causal efficacy. (*PR* 175)

Overall, Whitehead is here arguing that Hume's stance on causality is self-reflexive and that his analysis seeks to explain the causes of causality via the notions of repetition, contiguity in space and time, and resemblance. Similarly, his point is that if all ideas are derived from experience, and more accurately, from impressions of sensation (which is the fundamental principle of Hume's empiricism), then where does the impression of causality come from? Instead of taking the Kantian route in which causality is designated as an *a priori* idea, Whitehead states that it must come from experiences in which causality is actually manifested. This is exemplified by the causal efficacy of our environment on us and, for instance, human

struggles against the conditioning of our environment. Whitehead adds that to reduce all perception and all our evidence of necessary connections to perception in the mode of presentational immediacy, as Humean skepticism does if it is taken to its logical conclusion, ends up in the “solipsism of the present moment.”

For Whitehead, the notion of “solipsism of the present moment,” which was originally analyzed by Santayana in *Skepticism and Animal Faith*, is the result of confining all experience to presentational immediacy. Whereas Whitehead’s notion of causal efficacy points to “the hand of the settled past in the formation of the present” (*SB* 50), Humean empiricism, with its emphasis on evidence from presentational immediacy, confines experience to the immediate occasion, thereby admitting of immediate perception with no reference to the past or to the future. In other words, the problem is that presentational immediacy “gives only positive information about the immediate present as defined by itself” (*PR* 124). While Hume sought to confine all evidence to the mode of presentational immediacy, Santayana argued for the legitimacy of the intuitive belief or the “animal faith” by which we escape the solipsism of the present moment, admitting of the legitimacy of memory, induction, conceptual experience, causal connection, speculation, and even metaphysical thought, symbolism, and language. Whitehead refers and appeals to Santayana’s “animal faith” throughout his philosophical corpus, stating that in order to avoid the solipsism created by Humean skepticism, we must “include in direct perception something more than presentational immediacy” (*PR* 81), pointing to causal efficacy. As Whitehead maintains, the inquiries of the natural sciences both presuppose a limited trust in, and selectively depend upon this “something more,” which is not admitted from the perspective of unmitigated Humean skepticism.

Elsewhere, Whitehead criticizes Hume for considering perception as the ground for all feelings and ideas, and for presupposing that sense-perception is emphatically cognitive in nature. Whitehead calls this the “*a priori* sensationalist dogma, which bounds all Hume’s discoveries in the realm of experience” (*PR* 146). Whitehead claims that while Hume hunted for the experiential backing for the idea of “necessary connection,” namely, a corresponding impression for this idea, parts of Hume’s philosophy are “circular” or self-reflexive in the sense that Hume did not search for the corresponding impression of notions like “repetition” or “habit,” which are central to his empirical account of what is really

meant by causality.¹⁴ In *Science and the Modern World*, Whitehead argues that the empiricist account of the perception of a sense-object commits the fallacy of simple location and presupposes cognition. He claims that the empiricist analysis of the perception of a sense-object is fraught with the abstractions of consciousness. This is the case since, as perceived, the individual sense-object cannot be said to merely occupy a singular spatio-temporal location without reference to other sense-objects, or in his terminology, other events or actual occasions in the unity of experience. Furthermore, he states that “the word *perceive* is, in our common usage, shot through and through with the notion of cognitive apprehension.” Pointing instead to his notion of a prehension, meaning “*uncognitive apprehension* [or] apprehension which may or may not be cognitive” (*SMW* 69), Whitehead makes the case that experience is not primarily cognitive. A prehension refers to experience residing “below” cognitive awareness where, in his account, “perception is cognition of prehension” (*SMW* 71). The issue of the presupposition of cognition and its bearing on the question concerning determinations of causal connection will be outlined at length in the next sections of this paper.

One of the most penetrating criticisms Whitehead provides of Hume’s epistemology is concerning the latter’s assumption of substance ontology and its relation to the problem of the determination of causal connections. Hume’s philosophy provides a critique of Cartesian substance ontology. According to Hume, there is no empirical ground for the notion of a substance, since there is no experience of a thing’s form or essence. Rather, for Hume, all that we experience of a thing are its accidents. Therefore, for him, a thing is merely a bundle (or a collection) of its accidental properties. As Whitehead points out, Hume attempts to “minimize substances” (*PR* 136) in a similar fashion to the other great empiricist, Locke. However, Whitehead charges that while both Locke and Hume were critical of the metaphysical notion of substances, they did not overcome it in their respective epistemologies. In Whitehead’s account, Locke was “never tired of disparaging the notion of ‘substance’; but he gives no hint of alternative categories which he would employ to analyse the notions of an ‘actual entity’ and of ‘reality’” (*PR* 146). In similar fashion, Hume also did not propose an alternative metaphysical conception of a thing. Furthermore, Whitehead notes that Hume’s epistemology oddly presupposes that successive temporal occasions are individually independent and that impressions are self-contained. And, as Whitehead

recounts, “with this metaphysical presupposition [of substances], the relations between individual substances constitute metaphysical nuisances: there is no place for them” (*PR* 137). That is to say, since substances are defined by Descartes as “that which depend only upon themselves in order to exist,” relations between individual substances are “left on the sidelines” of metaphysical accounts which presuppose a substance ontology. From a Whiteheadian perspective, by not overcoming substance ontology, the empiricists thereby committed the “fallacy of simple location,” common to other reductionist understandings of the world.

Whitehead’s metaphysics of primordial relatedness

In *Science and the Modern World* and elsewhere, Whitehead’s elaboration of the “fallacy of simple location” and his criticisms of various perspectives which commit it, provide the mantelpiece upon which his cosmology of organic-relatedness is founded. Particularly, Whitehead argued that matter cannot be held to exist “in a definite region of space and throughout a definite finite duration in time, apart from any essential reference of the relations of that bit of matter to other regions of space and to other durations of time” (*SMW* 58). To do so is to commit the fallacy of simple location, which is the ground of his metaphysics of relatedness. Against the reductionism of scientific materialism and substance-ontologies, it is Whitehead’s contention that all references to any particular region necessitates, functionally speaking, a reference to other regions, a notion which gives birth to his perspective of organic interdependence. In contrast to epistemologies which assume traditional substance ontology, Whitehead’s process-relational cosmology of organicism is based in the notion that “the world is not (originally) made up of independent things, each completely determinate in abstraction from all the rest” (*ESP* 157). And, as against overt scientific reductionism and substance ontology, he states,

connectedness is of the essence of all things of all types. It is of the essence of types, that they be connected. Abstraction from connectedness involves the omission of an essential factor in the fact considered. No fact is merely itself . . . in every consideration of a single fact there is the suppressed presupposition of the environmental coordination requisite for its existence. (*MT* 9)

Corresponding to his emphasis on the interdependence of actualities, Whitehead’s categorical scheme is “a system of thought basing nature

upon the concept of organism, and not upon the concept of matter" (*SMW* 75). Specifically, Whitehead's metaphysics depicts the organic interrelatedness, solidarity, and togetherness of all entities, each requiring others in order to exist, and each thoroughly engaged in the creative life-process of becoming. For Whitehead, what happens to one organism or what it contributes to the environment directly affects the lives of the many, and vice-versa. In articulating his philosophy of interdependence and/or mutual immanence, he wrote that the organism, "by its influence deteriorates its environment, commits suicide" (*SMW* 109), a statement which has much reverberation in terms of environmental ethics.

Whitehead's view of Nature, as supported by "reliance on clear and distinct sensory experiences, visual, auditory, and tactile" (*MT* 128) is that it is primitively comprised by an extensive continuum. He states that "Nature is divisible and thus extensive" (*MT* 140), where

an extensive continuum is a complex of entities united by the various allied relationships of whole to part, and of overlapping so as to possess common parts, and of contact, and of other relationships derived from these primary relationships. The notion of a 'continuum' involves both the property of indefinite divisibility and the property of unbounded extension. There are always entities beyond entities, because nonentity is no boundary. (*PR* 66)

The notion that Nature is comprised primitively by an "extensive continuum" overcomes the traditional Cartesian substance ontology, but is partially derived from the latter's concept of "extended things" (*res extensa*). While things are extended spatio-temporally, they are abstractly divided by way of human consciousness out from the backdrop of the extensive continuum of Nature. In place of Cartesian substances, which are said to be "dependent on themselves for their existence," the basic ontological unit in Whitehead's system is called an "actual entity," or alternatively, an "actual occasion." These terms are synonymous with both the notions of "organism" and "event."

Within his cosmology of primordial relatedness, Whitehead holds that "actual entities atomize the extensive continuum. This continuum is in itself merely the potentiality for division; an actual entity effects this division" (*PR* 67). Hence, organic life is the conceptual "lens" through which Whitehead interprets Nature and natural processes. Consistent with environmental philosophy, it is basically through this conceptual "lens" that the analogy of the Earth as a "living organism" composed of a web

of interconnected ecosystems or “societies” of actual entities, mutually affecting and operating in conjunction with one another is developed. For example, in quite a Whiteheadian fashion, ecologists refer to the Amazon Rainforest as the “lungs” of the earth, designating its function in relation to the organic whole. In fact, writing in 1925, Whitehead wrote of the rich organic interdependency of the diverse species, trees, elements, and weather patterns found in the Brazilian rainforest. He stated,

The trees in a Brazilian forest depend upon the association of various species of organisms, each of which is mutually dependent on the other species. A single tree by itself is dependent upon all the adverse chances of shifting circumstances. The wind stunts it: variations in temperature check its foliage: the rains denude its soil: its leaves are blown away and are lost for the purpose of fertilization. You may obtain individual specimens of fine trees either in exceptional circumstances, or where human cultivation has intervened. But in nature the normal way in which trees flourish is by their association in a forest. Each tree may lose something of its individual perfection of growth, but they mutually assist each other in preserving the conditions for survival. The soil is preserved and shaded; and the microbes necessary for its fertility are neither scorched, nor frozen, nor washed away. A forest is the triumph of the organization of mutually dependent species. Further a species of microbes which kills the forest, also exterminates itself. . . . Every organism requires an environment of friends, partly to shield it from violent changes, and partly to supply it with its wants. (*SMW* 206)

In further depicting biodiversity and the solidarity of organisms which compose Nature, Whitehead states that it can be considered an “organic extensive community” (*PR* 289). Together, the multitude of actual entities compositional of Nature, “constitute a continuously extensive world” (*PR* 35) or an “extensive continuum,” which is in fact undivided, but which is divided ontologically by human consciousness and reason, e.g., our concepts and language presuppose such division. As Whitehead maintains, such divisions are made chiefly by operations of negative prehending in their fluctuating contrast with positive prehensions, the former being one of the chief characteristics of human consciousness. However, he warns that “the right coordination of the negative prehensions is one secret of mental progress, but unless some systematic scheme of relatedness characterizes the environment, there will be nothing left whereby to constitute vivid prehension of the world” (*PR* 254). Thus, while the division of the extensive continuum is part and parcel of conscious awareness of

the various phenomena in the world, and for example, of scientific and taxonomical reductionism enabling us to analyze the world, the overstatement of such division is an abstraction from our basic experience of the natural world, as primitively undivided and/or primitively related. The processive interplay of positive and negative prehensions also belongs to the selection of mutually relevant events as “causes” and “effects” in virtue of the elimination of other less relevant or irrelevant entities to the causal transaction. From a Whiteheadian perspective, this selection of “cause” and “effect” out from the backdrop of the extensive continuum is not without abstraction from that continuum.

In Whitehead’s cosmology, organic life is the primary ontological unit, a notion that stands in contrast to scientific materialism, which holds that the natural world is composed of dead, passive, valueless bits of matter which are hurrying through empty space. The employment of Whitehead’s metaphysical notion of “actual entities” or “occasions” as the basic cells composing Nature enable us to designate the interrelatedness and inter-functionality of organisms, rather than their strict separation from one another. Actual entities are said to “concrese” or grow together, and Whitehead’s cosmology goes to great lengths to describe how this process occurs. While some organisms can be considered more relevant to others, perhaps participating, functionally speaking, more strongly in the constitution of others, there are no strict boundaries or lines of division which may be said to separate the lives of organisms, species, ecosystems, and for that matter, natural occurrences. Whitehead holds that those boundaries are largely abstractions effected by human consciousness. They are the necessary product of, and conceptual tool of descriptive reason that we use to make sense of the world, but they do not exist as concrete realities. To be sure, today scientists are consistently learning that the phenomena that they investigate are interdependent with the rest of their environment. For example, disease is not just something that arises from within an animal body, but may result, in the causal sense, from conditions such as exposure to smog and pollution “outside” it, namely, in the organism’s environment. For Whitehead, while there is good reason to divide the extensive continuum into discrete actual entities, since they “lend themselves” to such modes of division, organic processes occur and extend across our posited taxonomical, conceptual, and ontological divisions of the world. The existence of naturally occurring hybrid species, which do not fit into the grouping

of one species or another, is but one exemplification of the abstractions created by such taxonomical divisions.

While Nature, for Whitehead, is “indefinitely subdivisible” (*PR* 285), actual entities live communally in, and compose the extensive continuum of space and time, which is, in fact, unbounded. What he calls “societies” of actual entities or “nexūs” are analogous to microcosmic and macrocosmic ecosystems which mutually interpenetrate each other. Whitehead suggests that “any division, including some activities and excluding others also severs the patterns of process which extend beyond all boundaries” (*MT* 140). In other words, organic processes occur and extend across our conceptual, taxonomical, and ontological divisions of the world. While we “carve up” the world in order to make sense of it, in reality, those boundaries do not exist. In short, there are no barriers to organic processes.

In Whitehead’s vision of nature, all actual entities of the objective world, regardless of whether we consider them to be “animate” or “inanimate,” “sentient” or “non-sentient” are organisms, where each organism is engaged in its own process of self-development. But this process is linked to its environment, and, to varying degrees contributes determination to other organisms. “It is hazardous,” Whitehead writes, “to draw any sharp distinction between living things and inorganic matter” (*FR* 5). As a more accurate characterization of the real things that make up the world, and a concept overcoming the world view derived from Cartesian substance ontology, Whitehead’s actual entities are finite “creatures which become” (*PR* 35), namely, they are engaged in a creative process of self-realization, they perish, and they are fundamentally constituted by their various relations with other actual entities. Also, contrary to Descartes’ dualism and division between thinking substances (*res cogitans*) and extended things or material substances (*res extensa*), Whitehead posits no such strict distinction in his cosmological scheme. Rather, all actual entities are organisms. While seemingly “inanimate objects” such as rocks, sand, dirt, and specks of dust, considered apart from other entities, are deficient in terms of the sentience and subjectivity of the “higher” organisms, like human beings, for Whitehead, their microscopic constituents are not entirely devoid of experience, feeling, and/or participation in the constitution of other actual entities. Like other actual entities, “inanimate objects” have a life-history which can be analyzed, they undergo change, and they are part of the experience of other organisms. For example, they provide habitats for micro-organisms. To be sure, seemingly “inanimate objects,” like a

coral reef and/or ground soil, are, in their active parts, organic, alive, or, at least are teeming with life. While we only seem to think of them in terms of their participation in mechanical or chemical processes, and not organic ones, such objects contribute to the overall organic functioning of the Earth, much like each of the organs in the human body contributes to the whole.

Analogous to the functioning of the total ecosystem of the Earth, in which all existents “conspire” interdependently together to create what is, where there is a dysfunction in one organ in the human body, such as the heart during a heart attack, the whole organism suffers. As such, Whitehead’s cosmological scheme lends itself well to an ecological perspective regarding Nature. However, while Whitehead’s overall cosmological picture as well as his critique of reductionism is accurate and provides a response to Humean skepticism, there is a very real possibility that such holism might be appropriated, misinterpreted, and overstated (as in radical environmentalist or anti-humanist positions), such that operations of division, decision, and differentiation become completely de-emphasized. With respect to this possibility, the view of cosmological relatedness becomes so prevalent that actual entities are not distinguished and/or become non-entities. It must be maintained that the natural sciences function on the basis of such eliminative cognitive operations and without them inquiry cannot be carried out.

Whitehead’s metaphysics of primordial relatedness as a partial response to Humean skepticism regarding determinations of causal connection

In Whitehead’s early philosophical works (1918-1922), the issue of the relatedness of Nature and its bearing on the question of the determination of causal connections was of central concern to him. For example, in his lectures on *The Principle of Relativity*, Whitehead establishes the main contours of the debate. He introduces his lecture as follows.

I propose to address you upon Relatedness and, in particular, upon the Relatedness of Nature. I feel some natural diffidence in speaking upon this theme in the capital of British metaphysics, haunted by the shade of Hume. This great thinker made short work of the theory of the relatedness of nature as it existed in the current philosophy of his time. It is hardly too much to say that the course of subsequent philosophy, including even Hume’s own later writings and the British Empirical school, but still more in the stream which descends through Kant, Hegel, and Caird, has been an endeavour

to restore some theory of relatedness to replace the one demolished by Hume's youthful skepticism. (*AN* 305)¹⁵

This introduction might be said to serve as an avenue of introduction to Whitehead's complete speculative philosophical corpus. And, throughout this early work, which is a precursor to the later development of his cosmological scheme, Whitehead offers the principles of the uniformity and the relativity of Nature as a response to Humean skepticism. Specifically, it is here that Whitehead takes his first step in outlining his later metaphysics of primordial relatedness.

Elsewhere, in another of his "earlier" texts, specifically, in *Principles of Natural Knowledge*, Whitehead makes a key comment which is central to the debate regarding determinations of causal connection. He states that:

'causal connection' is merely one typical instance of the universal ruin of relatedness. But then we are quite mistaken in thinking that there is a possible knowledge of things as unrelated. It is thus out of the question to start with a knowledge of things antecedent to a knowledge of their relations. (*PNK* 12)

Here, Whitehead is making the case that the whole notion of "causal connection" presupposes an already divided or objectified world out of which relations are derivative, such as that assumed in a substance ontology. He is further claiming that knowledge itself is not constituted by an understanding of independent substances abstracted from the rest of the world, but rather assumes the establishment of relations among entities. Thus, the interplay of connection and division (or separation) is central to establishing causality between entities. As was demonstrated in the previous section of this paper, Whitehead's metaphysics emphasizes Nature as primordially related, in abstraction from cognitive experience.

The importance of Whitehead's metaphysical postulation of the primordial relatedness of Nature and Hume's assumption of the separation of the entities of nature to the question of determining causal connection is highlighted by the debate between J.W. Robson and M.W. Gross, both in G.L. Kline's anthology entitled, *Alfred North Whitehead: Essays on His Philosophy*, which was originally published in 1963. While Robson's essay "Whitehead's Answer to Hume" largely takes the Whiteheadian side, Gross' response, "Whitehead's Answer to Hume: A Reply," is more favorable to Hume. However, while taking opposed points of view on the Hume-Whitehead debate, these two essays agree thematically with respect

to the issue of Whitehead's cosmological stance on the primitive relatedness of nature and its distinction from Hume's metaphysical assumptions in his epistemology. They both highlight the fact that Hume presupposed Cartesian substance ontology and neglected relatedness in his epistemology. Robson summarizes Whitehead's position as follows:

Whitehead argues that Hume, by neglecting the causal mode of perception, missed the essential relatedness of things and, by missing the essential relatedness of things, landed in skepticism. Hume could admit no official knowledge of the world, beyond impressions and ideas, barely presented. (Kline 1989, 55)

And, in his analysis of the Hume-Whitehead debate, Robson agrees with Whitehead's synopsis that Hume did not take into account the primitive relatedness in experience. Robson states, "I do not wish to question the criticism that Hume slighted the relational character of what we directly observe, nor the contention that the primary mode of perceptual experience is emotional and causal" (Kline 1989, 57).

Gross' essay makes a similar point regarding Whitehead's cosmological positing of the primitive relatedness of nature in contrast to a metaphysics of substance. While Hume in fact did anticipate a philosophical critique of substance ontology, in his epistemology, he assumed it. Gross states, at length,

In terms of the basic analysis of experience adopted by Hume the problem of induction is completely insoluble. If our experience is properly reducible to a complex of impressions, each of which 'requires nothing but itself in order to exist,' then Hume's argument concerning induction is irrefutable. Thus to answer Hume on induction it is first necessary to suggest a fundamentally different analysis of experience. Hume himself does not argue that his initial analysis is adequate; in fact, the whole of his critical philosophy can be considered as a demonstration of its inadequacy. The cosmological principles which justify the statements on the first page of the *Treatise* can be traced back to Descartes and are fundamental to the whole rationalistic-empiricistic tradition of the seventeenth and eighteenth centuries. It is this traditional cosmology, of which Hume's philosophy presents only an example, which Whitehead is concerned to attack, and the problem of induction is only one of the problems which this inadequate cosmology has bequeathed to us. We may list a variety of others: the general epistemological problem, the mind-body problem, the problem of internal versus external relations, the problem of final causes, of causality in general,

of personal identity, and a host of others. Whitehead's claims, and Hume seems to substantiate the claim, that none of these problems can be solved, in terms of the Cartesian cosmology, in such a way as to satisfy those persistent intuitions which are the ultimate criterion of the adequacy of any philosophical interpretation. Thus Whitehead's whole purpose is to provide a more adequate cosmology from which satisfactory solutions to these problems can be derived. (Kline 1989, 63)

Precisely, Gross points out that the difference between Hume and Whitehead is that, on the one hand,

Hume is dominated by the Cartesian notion of a substance as 'that which requires nothing but itself in order to exist.' He applies this definition explicitly to each impression, and thus can find nothing but external relations between the constituents of experience. Thus from the point of view of any one such constituent, whatever may happen to any other is completely irrelevant, and the uniformity of nature is quite accidental. (Kline 1989, 65)

And, on the other hand,

Whitehead, throughout his philosophy, is concerned to repudiate this conception of substance and to replace it by his doctrine of actual entities. Each actual entity is essentially 'social.' That is to say, each actual entity has a very definite relation to every other actual entity in the universe, and it is in virtue of these relations that it has the definite character which it does in fact have. This is a doctrine of internal relations, for in the course of the passage of nature an actual entity becomes what it is to be by means of its internal relations to, or prehensions of, its own immediate past and its environment. Societies of actual entities, which is Whitehead's term for the macroscopic things in our experience, physical bodies, organisms, and so on, are similarly dependent upon their environment for their existence, and if a society of a certain type is to survive, the environment must continue to provide that type of order which makes its existence possible. (Kline 1989, 65)

Therefore, as alluded to previously, while Hume anticipates a criticism of the metaphysical notion of a "substance," he inherits it from Cartesian metaphysics and assumes it in his epistemology. Later, Whitehead carries out the criticism of substance ontology, at first anticipated by Hume, and posits nature as primitively related, prior to all divisions effected by consciousness, including those pertaining to "causes" and "effects." Thus, I have here established that the problem posed by Humean skepticism of

the determination of causal connection is, in part, a metaphysical one. And the examination of the analysis of Robson and Gross has affirmed that the Whiteheadian premise of the primitive relatedness of nature remains an unchallenged one by the Humean account.

Having outlined Whitehead's critical treatment of Hume and how his cosmology emphasizes a primitive organic relatedness, I will now return to the major argument, concerning skepticism of claims as to the causal connection between human actions and environmental problems. To reiterate, Hume, presupposing the Cartesian substance ontology, claimed that *there is no empirically observable necessary or sufficient causal connection between putatively stated "causes" and "effects."* In other words, Hume stated there is nothing observable that one could point to as a "causal connection" between the "cause" and the "effect." And using this apparent epistemological lacuna at the heart of the notion of causality, many critics of the environmental sciences may argue that there is no empirically observable causal connection between human actions and environmental problems, as I characterized with respect to the two cases concerning: 1.) the establishment of the veracity and the causes of global warming and climate change and 2.) oil waste pits placed in the Ecuadorian rainforest and an accompanying increase in the number of cancer cases among its population.

On the contrary, while Hume's epistemology assumes an already divided world, Whitehead's cosmology holds that Nature is an extensive continuum that is "indefinitely subdivisible." This is not to assert that it is an *a priori* principle, that beyond human understanding, Nature is extensively continuous. Rather, Nature is extensively continuous only primordially, namely in relation to the prehensive mode of experience, in abstraction from cognitive experience. Actual entities are representative of a division, but these existents in the organic functioning "lend themselves" to these modes of division. Similarly, as Whitehead points out, "things are separated by space, and are separated by time: but they are also together in space, and together in time, even if they be not contemporaneous" (*SMW*64). Therefore, the division of the extensive continuum into actual entities is not merely subjective. Actual entities or occasions and what he calls "societies" of actual entities mutually interpenetrate and are mutually interdependent, as in a causal nexus. For Whitehead, simple one-to-one causality is an abstraction, since Nature is "a circumambient world of causal operations" (*PR* 176). That is to say, they compose a continuously

extensive world, a world which is originally unbounded, wherein each entity affects others in the causal sense, to different degrees of relevance. So, from the Whiteheadian perspective, not only are entities relationally interdependent, but they are interdependent in the causal sense. For Whitehead, “volumes of space have no independent existence . . . they are only entities as within the totality; you cannot extract them from their environment without destruction of their very essence” (*SMW* 65). Again, it is via human consciousness, and chiefly negative prehensions, that the conceptual division of the primitively related or interdependent world is selectively effected, so that we can make sense of it. Thus, from the basic perspective of Whitehead’s metaphysics, which emphasizes the primitive relatedness of Nature, and in contrast to the Humean account, it can be asserted that *there is no empirically observable causal separation between putatively stated “causes” and “effects.”* For example, there is no empirically observable separation between the burning of fossil fuels and global warming, or between the placing of oil waste-pits and the increase in cancer cases among an Ecuadorian population. To be sure, with respect to direct empirical perception, Whitehead states, “there is no clear division among genera; there is no clear division among species; there are no clear divisions anywhere” (*MT* 15).

From the Whiteheadian metaphysical perspective of primitive interdependence, instead of having the burden of proof resolutely on the side of having to prove the causal connections scientifically, the burden of proof would be balanced between hypotheses for and hypotheses against making such connections. Whitehead admits to the limited validity of the “abductive” form of reasoning in which scientists accept a hypothesis provisionally, as a “best estimate,” on the basis of its coherence to explain certain phenomena. In opposition to Hume, Whitehead writes that the method of abduction supports

the motive of unrest which urges scientists beyond mere satisfaction with the simple description, beyond even the general description. It is the desire to obtain the explanatory description which may justify the speculative extension of Laws, beyond actual, particular instances of observation. (*PR* 176)

In this way, Whitehead endorses, at least in part, the legitimacy and the reality of speculation in the natural sciences. As his whole philosophical corpus suggests, to reduce science to a narrow focus on empirical observation derived solely from the mode of presentational immediacy

defeats science along unmitigated Humean lines. In the same vein, Whitehead suggests that it is wrong to assume that “science is the mere description of things observed [with no presuppositions of] an objective world, nor causation, nor induction, . . . nor metaphysics” (*FR* 54). For him, metaphysics and the natural sciences are mutually critical, yet complementary forces in the advance of knowledge.

At any rate, it is clear that the basic starting points for Hume and Whitehead in respect to considering causality stand in opposition to one another. While some might argue that Whitehead’s system already holds the solution to the debate and successfully synthesizes the unmitigated Humean position with that of cosmological relatedness (especially through the notion of actual entities), there is the potential danger that Whitehead’s standpoint, in its overcoming of the notion of a substance, is interpreted as a totalizing holism. To be sure, analytic philosophers have long been critical of Whitehead’s emphasis on cosmological relatedness, holding that his metaphysics neglects differentiation. Therefore, in order to reinforce such a synthesis of Hume and Whitehead, I turn now to an analysis of Hegel’s examination of causality, which establishes that the notions of causality and substance necessitate one another. In the next section, I also intend to show how Hegel’s dialectical method may be used to provide a partial, synthetic resolution to the Hume-Whitehead debate surrounding causality.

The primacy of the logical concept (Begriff) in relation to causality in Hegel’s Logic

In the *Encyclopedia of the Philosophical Sciences*, and more precisely, in his *Science of Logic*, G.W.F. Hegel attempts to elucidate how the dialectical process of the logical Concept (*Begriff*) pervades the notion of causality. In a somewhat similar way as Whitehead, Hegel believes that causality is not merely a product of human subjectivity, but that it belongs to how objective states of affairs determine themselves. Of course, Hegel believes this more strongly than Whitehead, and possibly to the point of the latter’s “fallacy of misplaced concreteness.” For Hegel, not only is the rational identical with the real and vice-versa, but categories such as causality belong neither one-sidedly to subjectivity, nor to objectivity.

Concerning the Humean lacuna in respect to the lack of an empirical observance of a causal connection between putatively stated causes and effects, Hegel admits what empiricists might call “subjective content” in the consideration of what is actual, because, in part, it is derived from

experience. For Hegel, the content of causality is “both subjective and objective” (*Encyclopedia* 86Z), which echoes Whitehead’s notion (although in a much stronger sense) that objects “lend” themselves to the manners in which humans conceive of them, for instance, as causally related to one another. To be sure, Hegel writes that as regards

two events as standing to one another in the relationship of cause and effect; what is perceived here is the two isolated events, which succeed one another in time. But that one is the cause and the other is the effect (the causal nexus between them) is not perceived; on the contrary, it is present merely for our thinking. Now, although the categories (e.g., unity, cause and effect, etc. . . .) pertain to thinking as such, it does not follow from this that they must therefore be merely something of ours, and not also determinations of objects themselves. (*Encyclopedia* 85-86Z)

It may be quite striking to see Hegel here, in fact, agreeing with Hume that causal connections are not perceived, as when considering the cause and the effect to be two separate events or substances. But, this does not lead Hegel into skepticism concerning causality, as it did Hume. According to Hegel, cause and effect are inseparable and mutually dependent, both as subjective concepts and in actuality, even through their formally posited distinction as “cause” and as “effect” at the level of the understanding.

In Hegel’s assessment, the notions of substantiality and causality stand together dialectically. The notion of causality presupposes the concept of substance (and hence, a substance ontology), and vice-versa. As Hegel states, “substance is relationship (of causality) in the most proper sense . . . substance is cause” (*Encyclopedia* 225), since “the relation of substantiality *passes over* into the *relation of causality*” (*Science* 557). For Hegel, causality is not only how substances (the original things) are active in deploying and in dissolving their variable accidents, as for example, in the case of the rain causing wetness or in the case of a red pigment causing something to become colored red, but it is more than this. Since substantiality results from the dialectical process in which there is an “absolute overturning of form and content into one another” (*Encyclopedia* 226), a substance defined as “that which depends only upon itself in order to exist” determines itself in its independence over against another through causality. The substance which is the cause occasions, produces, or works on the effect, determining itself as cause and as substance, precisely by occasioning, producing, or working on an

effect. But, in the relationship of causality, Hegel reminds us that both the cause *and the effect* can be substances. He writes, the effect can be but “another substance present, upon which the cause happens to work” (*Encyclopedia* 229). As another substance, the effect reacts, namely, it

sublates the activity of the first substance; but the first substance is likewise this sublation of its immediacy or of the effect posited in it, so that it sublates the activity of the second, too, and reacts. As a result causality has passed over into the relationship of reciprocal action. (*Encyclopedia* 230)

Thus, a substance, as cause, in producing its effect, is “sublated” (i.e., it is “cancelled,” “preserved,” and “raised up”). For Hegel, the cause determinately produces its effect, yet it is finite because, inasmuch as the cause and the effect are represented as two independent substances, the first substance’s determinacy as “cause” is “sublated,” i.e., “perishes” or is “consumed” in the process of producing its effect. Not only does the cause produce its effect, but it is only in virtue of the production of the effect that the first substance can be said to be a cause. In other words, the effect is equally the cause of the first substance as “cause.” In this way, Hegel depicts causality as a process of reciprocal action, in which causes and effects, both substances, are considered to be symmetrically related and equally determinate (either as active or passive in the causal process), each sublating the other. The notion of *reciprocal action* implies not only one-way, or asymmetrical relationships in which a cause produces an effect, but that there is also a converse dialectical movement of a passing over from an effect to the cause. For Hegel, a cause and an effect are engaged in a symmetrical relationship, each acting and being acted on by the other, and each being mutually dependent on the other. From Hegel’s perspective, there is nothing in the cause that does not belong equally to the effect and vice versa, and as such, while held apart and made distinct by consciousness, the cause and the effect are inseparable in the relationship of causality; they are essentially one event. *Reciprocal action*, which is for Hegel the third, resulting term in the dialectical opposition between the notions of substance and causality, is representative of the identity-in-difference of cause and effect. Hegel makes the case that by logically separating causes from effects and vice versa in any strict way, or equally, by not making any substantive distinction between causes and effects, we enter into a spurious regress of thought. Similarly, effects may become causes, as for example, in the case of the potential “domino effects” which

are associated with global warming, such as the melting of permafrost and the resulting emissions of methane into the atmosphere. So, while for Hegel, reciprocal action is a superior concept to mere causality that may be employed in our attempts to comprehend the various phenomena in the world, in grasping the dialectic of causality, for Hegel, the notions of cause, effect, and reciprocal action form a triad in which all three terms are of equal importance.

Throughout his system, Hegel alludes to the fact that whatever is determinate is finite, and hence, determinate substances are finite substances. Therefore, while assuming a substance ontology, the merit of Hegel's analysis is to show that substances, through the process of their sublation via causality, are not as eminently distinct, self-contained, fixed, and/or static as, for example, posited by Descartes. It would seem that for Hegel, these are to be considered the moments of finite substantiality. For in Hegel's scheme, not only is the metaphysical notion of a substance sublated via the concept of causality, but also substances are themselves sublated in the causal process, i.e., through causality, a substance is "cancelled," "preserved," and "raised up." According to Hegel, causality is essentially the negative moment belonging to substances in their finite self-determination. As he writes, it is "the negative relation of substance to itself" (*Science* 558). As such, overall, Hegel's analysis of causality serves to show how the dialectic, or more accurately, the logical Concept (*Begriff*) pervades the conceptual and objective grounds of the very notions of substantiality, of causality, and of reciprocal action.

In addition to Hegel's examination of the dialectical relationship between the notions of substance and causality, I want to highlight the fact that, with respect to Hegel and the debate between Hume and Whitehead on the question of the determination of causal connection, is the Hegelian method of dialectical reasoning, which portrays Hume's and Whitehead's basic positions as essential "moments" in the working out of determinations of causal connection. Hegel believes that philosophical controversies can be analyzed in terms of what he called the dialectical movement of the "logical Concept" (*Begriff*). By way of elucidating three general "moments": the "preserving" (*conservare*), the "cancelling" (*tollere*), and the "raising up" (*elevare*), Hegel attempted to express how oppositions, both subjective and objective, are worked out by way of a dialectical process, and chiefly through the "sublation" (*Aufheben*) of one-sided positions resulting and the forming of a new synthetic unity. The closest analogue

in Whitehead's speculative philosophy to the notion of a synthesis is his concept of a "logical contrast" by which he means that "opposed elements stand to each other in their mutual requirement" (*PR* 348).

Corresponding to the dialectical unfolding of the logical Concept (*Begriff*) belonging to the progress of philosophical thinking and at the root of all phenomena in the objective world, Hegel also distinguishes three moments: that of the "understanding," the "skeptical" moment, and the "speculative" moment. First, Hegel associates the "understanding" with reasoning based in finite and one-sided determinations and propositions common in presuppositions to "immediate knowledge," yet limited by the common "either-or" type of reasoning. For instance, in relation to determinations of causal connection, the understanding might hold that "the burning of fossil fuels by human beings is the cause of global climate change" or "the placement of oil waste pits near villages in the Ecuadorian Rainforest is the cause of the rise in cancer and leukemia cases among the population." But, from a Hegelian perspective, the understanding fallaciously attempts to separate the cause from the effect, leading into contradiction. The second moment (i.e. the "skeptical" moment) is represented as the "negatively dialectical moment" in which the one-sided determinations of the understanding overturn into their respective opposites. It involves assertions which are contradictory to the determinations of the understanding just established, namely, "the burning of fossil fuels by human beings is not the cause of global climate change" or "the placement of oil waste pits near villages in the Ecuadorian Rainforest is not the cause of the rise in cancer and leukemia cases among the population" because, for example, there is no empirically observable thing which is identifiable as the connection between them. Here, Hegel considers that "dialectic is often (considered to be) no more than a subjective seesaw of arguments that sway back and forth" (*Encyclopedia* 128), but he goes to great lengths to recognize that "the dialectic constitutes the moving soul of scientific progression . . . [and] is also the soul of all genuinely scientific thought" (*Encyclopedia* 128-129Z). Third, Hegel's speculative moment is the result of the working out of the opposition between the determinations of the understanding and skepticism. It is that which "apprehends the unity of the determinations in their opposition" (*Encyclopedia* 131). For Hegel, the notion of speculation is not just making vague or abstract hypothetical claims, abandoning all requirement of an empirical warrant for them. Rather, speculative philosophy involves the recognition of the "unity of distinct determinations"

(*Encyclopedia* 131), but not a mere suspension of judgment in respect to controversies and debates. Essentially, speculative philosophy involves the mature concurrence of all the relevant knowledge and evidence surrounding a particular controversy, the potential working out of the opposition between one-sided extremities, as well as the possibility of arriving at the best estimate of the truth in respect to competing claims.

We may further apply Hegel's method of dialectical reasoning to the debate between Whitehead's doctrine of primitive relatedness and Humean skepticism, treated as moments within the process of the working out of determinations of causal connections. While Whitehead's vision of the relatedness of Nature offers a more accurate picture than the one afforded by the Cartesian metaphysics (that Hume presupposes), Humean skepticism, employed in particular instances, ensures that the causes of phenomena are determined (e.g., by scientists) beyond simply being merely related to one another vis-à-vis the metaphysical principle of universal relatedness. In this sense, Humean skepticism motivates scientists to inquire into the relevant causes of phenomena (e.g., environmental problems) in order to resolve them, and to do so with ever-increasing precision in eliminating false or irrelevant causal factors (although not spuriously so in terms of an infinite progress of determinations). While the Whiteheadian vision saves the Humean one from the overstatement of reductionism which leads to skepticism, the Humean position ensures that determinations of causal connection are well-founded and rescues Whitehead's vision from indeterminacy, irrelevance, and vagueness in respect to making claims concerning potential causal connections. Therefore, the overall picture that I would like to convey is that skeptics of claims about causality linking environmental problems to human actions are right to challenge environmentalists and scientists, because it is the skeptical challenge that motivates scientific inquiry to continue to experiment and observe, toward finding precise causal links which explain how particular phenomena come to be in the first place. As such, such skepticism must be preserved, but skeptical claims should not be overstated so as to derail hypotheses for which there is widespread scientific consensus.

It is in the preservation of the tension between the Whiteheadian doctrine of primitive relatedness and Humean skepticism regarding determinations of causal connection that "the truth" of particular instances of causal connection is worked out. In particular, it is through the metaphysical assumption of primitive relatedness that causal relationality can be held

to pervade Nature in terms of ecosystems, ecosystems within ecosystems, and ecosystems compositional of the web of life on the planet, but it is through Humean skepticism that scientists are motivated both to inquire into and to exhibit the exact “hows” of the causal connection, if any. With respect to Whitehead’s doctrine of the primitive connectedness of Nature and his positing of the interrelation of actual entities as compositional of “extensive” continuum, Nature is not primordially divided, but it lends itself to potential division through the operations of discrimination involved in consciousness and/or conscious awareness.¹⁶ Lastly, a Hegelian point of view can be adopted in order to synthesize Hume’s claim (which assumes a substance ontology) that we do not observe any necessary causal connection among distinct things with Whitehead’s essential claim that we do not observe any necessary causal separations in Nature. Again, each of these moments belongs authentically in the process of inquiry by which the truth may be worked out in relation to putative environmental problems and their possible causes.

The Hume-Whitehead contrast in relation to determinations of causal connection

The preceding analysis has contrasted the Humean and Whiteheadian positions with respect to making determinations of causal connection concerning environmental problems. Analogous to Hegel’s articulation of the three-fold dialectical movement of the logical Concept (*Begriff*), it has demonstrated that it is by way of the working out of the preserved tension between Whitehead’s metaphysics of the primitive relatedness of Nature and Humean skepticism that particular instances of causal connection may be determined (to varying degrees).

Overall, this paper has argued against the potential instrumental exploitation of the unresolved Humean epistemological lacunae surrounding causality in order to discount determinations of the causal connection between ecological problems and human actions. It has made the case that by treating the contrasting Whiteheadian and Humean perspectives as “moments” within the Hegelian dialectical framework, respectively, we may arrive at a balanced, three-fold “process” approach to making determinations regarding causal connection, especially in relation to environmental problems. Within this threefold conception, on the one hand, Humean skepticism provides the motive power for rigorous scientific inquiry and for critical scrutiny regarding scientific hypotheses concerning environmental

problems. On the other hand, Whitehead's position serves to undercut the potential employment of unmitigated Humean skepticism as a *Semmelweis reflex* in relation to any and all determinations of causal connection concerning ecological problems. In virtue of the dialectical working out of these two moments (as employed in Hegelian manners of philosophizing), determinations of causal connection stemming from scientific inquiry may proceed in a third, unifying moment. It is upon this "level" playing field that the evaluation of claims and scientific investigations into the "causes" of environmental problems should be carried out.¹⁷

Notes

1. A previous version of this paper was presented at the Ecological Ethics section of the 6th International Whitehead Conference in Salzburg, Austria, July 2006.
2. For articles that are skeptical of the scientific hypotheses regarding global warming, see: Robinson (1997) online at: <www.junkscience.com/news/robinson.htm>.
3. "Bush Dismisses Global Warming Report." CBS World-Wide, Reuters Limited, Associated Press, June 4, 2002. Online at: <<http://www.cbsnews.com/stories/2002/06/03/tech/main510920.shtml>>.
4. "The World Over A Barrel: The Oil Curse." Television Documentary. Canadian Broadcasting Corporation. Originally aired: August 4th, 2004. Also see "The Oil Curse." CBC Documentaries. Online at: <http://www.cbc.ca/documentaries/oil/curse_ecuador.html>.
5. "Texaco in Ecuador." Chevron U.S.A. Inc. Online at: <http://www.texaco.com/sitelets/ecuador/en/response_to_claims/health_claims.asp>. My emphasis.
6. A. Maest, M. Quarles, and W. Powers. "How Chevron's Analysis and Sampling Standards Minimizes Evidence of Contamination." March 10, 2006. Online at: <http://www.amazonwatch.org/amazon/EC/toxico//view_news.php?id=1065>.
7. The significance of Hume's notion of "events" is summed up by Dicker (1998), 69-70, where he states that Hume's description of

both the cause and effect . . . as being "events" . . . reflects an important insight: . . . namely, that the true members of a cause-effect

relationship are events, rather than objects. . . . Given that a cause and its effect are two distinct events, it is false to say that we discern or discover the effect in the cause; for example, that we can discern or discover the event of the window breaking in the event of the rock hitting the window, in the way that we could discern or discover chocolates in a box of chocolates. . . . An event which is the *effect* of another event (as opposed to being a part of it) cannot be discerned in the event that caused it, cannot be discovered just by examining or scrutinizing the cause-event, no matter how minutely. Therefore, . . . the effect cannot be contained in the cause, as in the rationalist conception of causality.

8. Hume writes, “I am persuaded, there might be several useful discoveries made from a criticism of the fictions of the ancient philosophy, concerning substances, and substantial forms, and accidents, and occult qualities; which, however unreasonable and capricious, have a very intimate connexion with the principles of human nature” (*Treatise* 268).

9. For Hume, “all our ideas are nothing but copies of our impressions, or, in other words, that it is impossible for us to think of anything, which we have not antecedently felt, either by our external or internal senses” (Dicker 1998, 99-100, quoting Hume’s *Treatise*), a notion at the root of his standpoint of empirical realism. In a parallel manner, Whitehead explains his “provisionally realistic stance” as follows:

The philosophy of organism is the inversion of Kant’s philosophy . . . [which] describes the process by which subjective data pass into appearance of an objective world. The philosophy of organism seeks to describe how objective data pass into subjective satisfaction, and how order in the objective data provides the intensity in the subjective satisfaction. For [the idealistic schools], the world emerges from the subject; for the philosophy of organism, the subject emerges from the world—a ‘superject’ rather than a ‘subject.’ (*PR* 88)

Elsewhere, as depicted in the theory of prehensions, “the objective content of the initial phases of reception is the real antecedent world, as given for that occasion [which] . . . is the ‘reality’ from which the creative advance starts” (*AI* 210), a standpoint similar to that of Hume. In a similar fashion as Hume’s *Dialogues Concerning Natural Religion*, Whitehead’s philosophy of organism does not follow the Kantian need to refer to causality as an *a priori* idea. Instead, he maintains the Humean principle that all ideas are derived from experience. For Whitehead, this does not somehow “undercut” or “cheapen” the reality of the creative process in the lives of organisms.

10. Also see Dicker 1998, 108-09, who states “until quite recently, virtually all . . . scholars have taken Hume to have totally rejected the view that there are necessary connections between events. Against this standard interpretation, however, some writers have recently advanced an interpretation which Kenneth Winkler (1991, 541-79), a contemporary Hume scholar, aptly calls “the New Hume.” According to proponents of this New Hume, Hume denied that humans *know* that there are necessary connections between events, but allowed that such connections may nevertheless exist. Indeed, several of these proponents have gone so far as to assert that Hume himself actually believed that such connections exist, even though he admitted that neither he nor anyone else could know this to be the case.”

11. In the essay, “Is Science Superstitious?” (1926) Russell provides an analysis of Whitehead’s *Science and the Modern World* and weighs in on the idea that Whitehead has provided a response to Hume surrounding the notion of causality. He states,

the great scandals in the philosophy of science ever since the time of Hume have been causality and induction. We all believe in both, but Hume made it appear that our belief is a blind faith for which no rational ground can be assigned. Dr. Whitehead believes that his philosophy affords an answer to Hume. So did Kant. I find myself unable to accept either answer. And yet, in common with everyone else, I cannot help believing that there must be an answer. This state of affairs is profoundly unsatisfactory, and becomes more so as science becomes more entangled with philosophy. We must hope that an answer will be found; but I am quite unable to believe that it has been found. (*Skeptical* 33-35)

12. See *PR*, where Whitehead states:

The philosophy of organism accepts the man’s statement, that the *flash* made him blink. But Hume intervenes with another explanation. He first points out that in the mode of presentational immediacy there is no percept of the flash *making* the man blink. In this mode there are merely the two percepts—the flash and the blink—combining the two latter of the three percepts under the one term ‘blink.’ Hume refuses to admit the man’s protestation, that the compulsion to blink is just what he did feel. The refusal is based upon the dogma that all percepts are in the mode of presentational immediacy—a dogma not to be upset by a mere appeal to direct experience. Besides, Hume has another interpretation of the man’s experience: what the man really felt was his *habit* of blinking after flashes. The word ‘association’ explains it all, according to Hume.

But how can a ‘habit’ be felt, when a ‘cause’ cannot be felt? Is there any presentational immediacy in the feeling of a ‘habit’? Hume by sleight of hand confuses a ‘habit of feeling blinks after flashes’ with a ‘feeling of a habit of feeling blinks after flashes.’ (174-75)

13. As Lowe (1990) summarizes, “Whitehead attacks Hume’s denial that there is any perception of causal efficacy by simply asking for the meaning of ‘by’ in his observation that if the idea of substance is perceived by the eyes it must be a color, if by the ears a sound, if by the palate a taste. Was Hume not assuming that what he called ‘impressions’ are given by the causal efficacy of eyes, ears, and palate?” (209).

14. Accordingly, Whitehead states that in the beginning of his *Treatise*, (Hume) lays down the “general proposition”:

“That all our simple ideas in their first appearance, are derived from simple impressions.” . . . He proves this by an empirical survey. But the proposition itself employs—covertly, so far as language is concerned—the notion of ‘repetition,’ which itself is not an impression. Again, later he finds ‘necessary connection’: he discards this because he can find no corresponding impression. But the original proposition was only founded on an empirical survey; so the argument for dismissal is purely circular. Further, if Hume had only attended to his own excellent Part II, Section VI, ‘Of the Idea of Existence, and of external Existence,’ he would have remembered that whatever we do think of, thereby in some sense ‘exists.’ Thus, having the idea of ‘necessary connection,’ the only question is as to its exemplification in the connectedness of our ‘impressions.’ He muddles the importance of an idea with the fact of our entertainment of the idea. We cannot even be wrong in thinking that we think of ‘necessary connection,’ unless we are thinking of ‘necessary connection.’ (PR 135)

15. Whitehead’s main thesis in *The Principle of Relativity* is that “we can discern in nature a ground of uniformity, of which the more far-reaching example is the uniformity of space-time and the more limited example is what is usually known under the title, the Uniformity of Nature” (AN 305).

16. The following is an addition to this three-fold “process” conception of the determination of causal connections. From the perspective of the Whiteheadian doctrine of primordial relatedness, no two existing events, objects, or phenomena are by necessity “causally separable,” and all events, objects, or phenomena in existence are causally connected to various degrees. Hence we might establish a continuum of degrees of causal connection between event, object, phenomenon A and event, object, or phenomenon

B as follows, which are selected and determined via the interplay of positive and negative prehensions:

- 1.) There is a causal connection with great positive and direct relevance (i.e., a direct causal correlation between particular events, objects, phenomena or factors in Nature that may be exhibited scientifically).
- 2.) There is a causal connection with some positive and direct relevance (i.e., some direct causal correlation between particular events, objects, phenomena or factors in Nature that may be exhibited scientifically).
- 3.) There is a causal connection with some positive and indirect relevance (i.e., some indirect causal correlation between particular events, objects, phenomena, or factors in Nature within a larger causal nexus, which may be exhibited scientifically).
- 4.) There is a causal connection with negligible or “low” relevance (i.e., an indirect causal correlation between particular events, objects, phenomena, in factors in Nature that may or may not be exhibited scientifically).
- 5.) There is a causal connection with negative relevance (i.e., an indirect “existential” causal correlation conforming only to the primitive relatedness between particular events, objects, phenomena or factors within Nature, which may or may not be exhibited scientifically).

17. A subsequent thread to this discussion is the issue of whether or not Whitehead’s process-relational metaphysics, having actual entities or occasions as the basic atomic building-blocks, rather than substances, challenges, enhances, or overcomes the traditional concept of causality. In other words, if substances and causality mutually presuppose one another (as Hegel demonstrates), then how are we to consider causality from the process perspective (which overcomes substances)? Certainly, as was alluded to previously in this paper, Hume anticipated an imminent critique of the notion of substances, but at the same time presupposed a reductionistic world view. And it is clear that traditional conceptions of causality are themselves reductionistic. But it may be suggested that, on one level, while Whitehead refers to the various traditional forms of causality throughout the theory of prehensions and attempts to respond to Humean skepticism regarding causality, at another level, his perspective forces us to rethink the notion of causality or to consider some form of a “holistic” or “process” causality. This is the case, since, as was elucidated in relation to Hegel in the previous section, the traditional conception of causality presupposes a substance ontology. Certainly, the traditional Aristotelian notion of a substance defined as a “unity of matter and form” goes hand-in-hand with his doctrine of four-fold causality.

Regarding the relationship between substance ontology and causality, in the *Physics*, Aristotle set out his theoretical understanding of causality, identifying four types of causality, and made distinctions among them. His four-fold theory of causality confirms that the notions of substance and causality presuppose one another. For Aristotle, because all things are in a process of coming into being (and going out of being) with respect to any existent thing (or a substance, a unity of matter and form) whatsoever, according to him, we may ask four questions: 1.) what is it? 2.) out of what is it made? 3.) by what is it made? and 4.) for what purpose (*telos*) or why is it made? The answers to these four questions point to Aristotle's doctrine of the four causes:

- 1.) The *formal cause* is a notion which has two interconnected senses, first, as determining what a thing is, or its essence, its nature, according to which a thing develops, namely, what it is to be this thing which, in turn, explains its functioning. For instance, we may explain that to be a human being, as Aristotle did, is to be a "featherless biped with a rational soul." But also, second, as part of the thing's essential character, the notion of a formal cause includes the form the physical material has entered or the thing's structure, for example, the cross-like shape of a sword, or the cylindrical pommel enabling the guard to grip the blade.
- 2.) The *material cause* is that out of which a thing comes to be or is made, which explains many of its properties; for instance, in the case of the sword, the iron used to make it explains its hardness and potential sharpness.
- 3.) The *final cause* is the end or purpose (*telos*) for which it is made; for instance, for use in guarding the castle against intruders.
- 4.) The *efficient cause* is the activity by which the thing is made or produced. Or, it is the immediate origin of its movement or rest, and/or what brings about or "effects" the thing, for example, the work of a blacksmith in forging the sword.

For Aristotle, the four causes are to be used in (scientific) investigations of Nature or in providing explanations of things. Because the four causes are derived from questions which ask for some explanation of the origins of a thing, they may be considered as ways of explaining the origins of things. In any case, it is clear here that Aristotle's formal and material causes presuppose his notion of substances (defined as being the unity of matter and form), as the basic metaphysical building blocks of reality. In contrast, Whitehead's actual entities do not share the Aristotelian definition of substances as a unity of matter and form. Also, Whitehead does not agree with Aristotle's notion that entities are expressible in logic and in language via the "substance-predicate" form of proposition. For Whitehead, while the real may lend itself to these sorts of conceptions (e.g., substance-accident), their overstatement is the

meaning of the fallacy of misplaced concreteness. In Whitehead's thinking, the notion of substances fails to fully express the structure of the real.

Some scholars have pointed out that Whitehead failed to make a distinction between Aristotle's conception of a substance and that of Descartes. Aristotle defined substances as "ultimate subjects (of change), which is no longer said of anything else," providing an explanation for constancy-through-change and as "this so-and-so, which is also separable" (*Metaphysics*, Book 5, in Thomson 49). It was Descartes' interpretation of the notion of a substance which was thoroughly caught up with the "that which depends only upon itself in order to exist," that is, for one commentator, J.W. Felt (1985), the real subject of Whitehead's criticism. In "Whitehead's Misconception of 'Substance' in Aristotle," Felt (1985), quoting L.J. Eslick, argues against Whitehead's lack of a distinction between the Aristotelian and Cartesian versions of the notion of a substance, stating,

it is a travesty to depict Aristotle's substances as static and inert, hermetically sealed off from . . . other entities and devoid of any internal becoming. . . . In saying, therefore, that 'Entity' is never present in another as in a subject, Aristotle is not at all concerned to deny that (or even to ask whether) primary Entities are related efficaciously to one another. . . . For Aristotle, Entity is dynamic and changing, rather than passive and static. (*Substance* 225)

In this manner, according to Felt, because of his motivations in criticizing mechanistic materialism, Whitehead misinterpreted Aristotle's conception of substances as being intrinsically separate from each other, vacuous, and inert. For Felt, Whitehead wrongly saw the notion of substances as aligned with mechanistic materialism. And Felt claims that Whitehead also misconstrued Aristotle's notion that a substance "cannot be present in a subject," something that the former repudiates in his metaphysical scheme. However, while Felt's analysis of the lack of distinction in Whitehead between Aristotelian and Cartesian substances is accurate, it may be countered that Felt's analysis of an Aristotelian substance changing over time is confined to an analysis of the change of its various accidents/qualities which, in turn, participate in the makeup of the substance. That is to say, Felt carries out his analysis in abstraction from any direct analysis of change in respect to the "essential meat" of the substance in question, concentrating instead on change in the substance's accidents. In defense of his examination of change in respect to the substance's accidents, Felt states that this represents change in the substance itself, and argues that Whitehead missed that the "the substance is the whole thing" (*Substance* 236), including its accidents. But, Whitehead does not need to learn anything about holism here. Felt's point here serves merely to exemplify the distinction between Whitehead's metaphysics and Aristotelian

substance ontology, in that Whitehead's actual entities are, as part of their "essential meat," fundamentally interrelated, dynamically in flux, although they may exhibit an enduring identity. Moreover, Whitehead's actual entities may perish and lose their identity (their "essential meat" and not just their properties), or they may gain it through their creative process.

Regardless of this controversy, it may be speculated that Martin Heidegger has already carried out the project of rescuing a holistic conception of causality from substance ontology, something that Whiteheadian thought forces us to do. In his later works, such as "Building, Dwelling, Thinking," Heidegger can be seen to render Aristotelian four-fold causality (material cause, formal cause, final cause, and efficient cause) respectively in his own, more aesthetic and holistic fourfold: namely, that of earth, sky, divinities, and mortals. These four elements are as much "the reasons" for the existence of every entity, as belonging to their very make-up. Heidegger's fourfold seems to emerge from his reflections on Aristotle's doctrine of the four causes in his philosophizing concerning the essence of technology. While I will have to substantiate this claim of a connection between the Aristotelian four-fold concerning causality and Heidegger's holistic four-fold further, it is perhaps this rendering of Aristotelian fourfold causality which distances Heidegger from instrumentalist interpretations of causality as a "bringing-forth," which pertain to his critique of modern technology as "enframing" (*Ge-Stell*) in "The Question Concerning Technology." Quite abstractly, for the later Heidegger, every being is a "gathering together," a "unity," or a "concrecence" (possibly akin to the Whiteheadian sense of the term), of earth, sky, divinities, and mortals. Whether or not Whitehead's philosophy of organism, in its overcoming of traditional substance ontology, and hence, of traditional conceptions of causality, can be extended to provide a parallel process theory to Heidegger's own four-fold, is a question that I shall have to leave to a future work.

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