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Agnotology: Ignorance and Absence or Towards a Sociology of Things That Aren't There

Jennifer L. Croissant

The study of ignorance, or agnotology, has many similarities with studies of absence. This paper outlines a framework for agnotology which is shaped by interdisciplinary studies of both ignorance and absence, and identifies properties such as chronicity, granularity, scale, intentionality, and ontology in relation to epistemology as useful for studying ignorance. These properties can be used to compare various case studies. While not all problems of ignorance are problems of absent knowledge, those that are can gain by an examination of the literatures on absence and the concept of the privative. The lack of symmetry in explanation and representation are methodological challenges to studying ignorances and absences.

Keywords: Agnotology; Ignorance; Error; Uncertainty; Absence

If we knew what we were doing, it wouldn't be research. Albert Einstein

Studying ignorance invites bad puns and awkward moments of self-reflection. Proctor claims that we "know very little about ignorance" and the cases studies in the important volume *Agnotology: The Making and Unmaking of Ignorance* (Proctor and Schiebinger 2008) are meant to encourage thinking about the "structural production of ignorance." Like other recent work "making ignorance an ethnographic object" (Mair, Kelly, and High 2012) this paper is meant to be another contribution to the emerging conversation on ignorance. It is meant, however, to frame the problems of ignorance, particularly those which are matters of absent

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knowledge, to be a more specific set of cases in the consideration of absences more generally. Or conversely, considering other things that are not there sheds light on some finer distinctions that might be made within the emerging framework of agnotology, particularly the distinction between absent knowledges as forms of non-knowledge in relation to other agnoses, such as alternative, controversial, illusive, rejected, or otherwise erroneous knowledges (see Machlup 1980 for these categories of what he terms "negative knowledge") which are not matters of absence per se. This paper is organized into two parts: the first, considers agnotology and other studies of ignorance from their various disciplinary origins, continuing with a discussion of privatives and other forms of absence. The end result is a set of clarifications that are meant to enhance the study of ignorance and absences through examining their points of contact and divergence.

Agnotology: Properties of Ignorance

In the emerging field of studies of ignorance, tracing its relation to synonyms is the traditional first step in the project (Bernstein 2009a, 2009b; Gross 2010; Proctor and Schiebinger 2008, p. 2; Rescher 2009), and thus I feel free to continue that fine practice and point out some of the interesting associations that the term ignorance has, as a connotative and denotative referent. Terms include, benightedness, bewilderment, blindness, callowness, crudeness, darkness, denseness, disregard, dumbness, empty-headedness, fog, half-knowledge, illiteracy, incapacity, incomprehension, innocence, inscience, insensitivity, lack of education, mental incapacity, naiveté, nescience, oblivion, obtuseness, philistinism, rawness, sciolism, shallowness, simplicity, stupidity, unawareness, unconsciousness, uncouthness, unenlightenment, unfamiliarity, unscholarliness, and vagueness. Technical terms that have emerged include *nichtwissen*, negative knowledge, and non-knowledge, and of course agnotology. The presence of terms that have contrasting connotations within the list of synonyms (innocent and uncouth, for example), as well as the vast interdisciplinary of the scholarship on the topic lead to a great deal of confusion and complexity in studying ignorance. Fields include library and information science, psychology and cognitive science, philosophy, sociology, and history, plus popular commentary and disciplinary approaches in the humanities.

Agnotology is a term rechristened from *agnatology* by historians Proctor and Shiebinger (2008) who so handily encapsulated some new and important cases of problems of ignorance into a potential program of study. The categories and examples from Proctor and Schiebinger include identification of ignorance as native state, a lost realm, selective choice, passive construct, and strategic ploy or active construct, and as moral caution or mode of resistance. Throughout this paper the terms non-knowledge, ignorance, and agnosis will be used. Like Gross (2010), Smithson (1989), and others (Kerwin 1993; Ravetz 1993) I am seduced into yet another typological work on ignorance, but wish, like Gross, to avoid a

linear typology and also to integrate multidisciplinary tools and a comparison with theories of absence to improve clarity in thinking about ignorance.

Smithson argues that a typology of ignorance must make consistent distinctions and be consequential (2008, pp. 211–2), and thus I propose here five important attributes that might be applied to cases studies of ignorance or non-knowledge. My goal is not some fully formed generalizable theory of ignorance, but a framework which allows cross-case comparisons and systematic sociological analysis across different domains, even as the challenges of postmaterialist (Latour 2007) and postrepresentational theories (Barad 1007) and anthropological specificity (Bille, Hastrup, and Sorensen 2012; High, Kelly, and Mair, 2012) warn against such a project. (1) To speak of the ontology of ignorance refers to questions about the presence or absence of knowledge, both in relative terms, such as when one person knows something someone else is ignorant about, but especially in regards to the question of uncertainty. As I discuss in more depth below, there are forms of uncertainty that are the results of as-yet unrefined models, and others that are foundational to stochastic or probabilistic phenomena. (2) Chronicity refers to issues of time and the prospective and retrospective elements of knowledge and non-knowledge identification. (3) Granularity refers to the "texture" of the (non) knowledge—concrete facts of specific purview having a fine granularity, while broad statements of knowledge or domains of inquiry have a coarse granularity. (4) Scale, independent of granularity, concerns identification of the level of analysis and causality in the assessment of ignorance. This can range from individual information or cognitive processes, to the workings of cultural formations and ideologies which shape broad matters of interest, inquiry, and explanation. The final dimension discussed has to do with (5) intentionality, whether from direct intent such as fraud or hoaxes, and various forms of censorship, nondisclosure, or knowledge non-transmission, to inadvertent ignorances unconsciously produced through various effects. I review each of these attributes below.

Ontology and Epistemology

Oreskes and Conway (2008) discuss the "ignorance" surrounding the issue of global warming. As outlined in their work, there has been enough scientific consensus and a multiplicity of evidence since the mid-1990s to be able to state empirically that anthropogenic global warming has occurred. However, conservative think tanks have stressed the "uncertainty" of the models and the evidence. This represents a conflation of the meaning of uncertainty as a probabilistic outcome, and uncertainty meaning unknown or unreliable. Smithson also argues that uncertainty and ignorance are often conflated in their respective literatures (2008, 214; e.g. Tapp 2000), while Michaels (2008) similarly situates problems of agnotology in the realm of problems of probabilistic outcomes, rather than problems of the existence of knowledge in contestations over toxic chemicals and public health. This points us in the direction of a distinction between

knowledges that are uncertain as unknown-at-this-time, to be solved with more research or better modeling, vs. knowledges that are fundamentally based on stochastic process by which probability, and thus uncertainty, are endemic to the system.

Rescher (2009) frames this important distinction as between ignorances which are epistemological vs. those which are ontological (pp. 100–1). That is, he helps us to distinguish between those agnoses that are he calls "cognitively inaccessible" because we do not yet know, where ignorance is a matter of epistemology, vs. things that are unknowable as a matter of property, that is "developmentally open" via causal indeterminacy or contingencies of "choice, chance, or chaos" (101) as matters of ontology. Gross (2010, p. 1) capitalizes on the concept of the uncertainty in his analysis of surprises: "Ignorance and surprise belong together." The management of ignorance and its resulting surprises a major feature of knowledge-based societies (Beck 2007). Gross clarifies Merton's (1987) specified ignorance in relation to the terms nescience, non-knowledge, and negative knowledge. In Gross's typology, non-knowledge is related to Merton's (1987) specified ignorance, the ignorance of a discipline which knows where the unknowns are. Where is that damned Higgs Boson?[1] Thus, a hypothesis is a kind of specified ignorance, based on the presumed existence for a known unknown.

So, as outlined by many scholars, certain kinds of ignorance are the after-effects of knowledge processes, including the identification of known-unknowns and future work, or Merton's "specified ignorance." For example, Jacklin, Robinson, and Torrance (2006) discovery of a lack of data about children in public care here qualifies as a form of specified ignorance. In the spirit of Foucault, forms of ignorance are the necessary dual effects of knowledge productions. Relational ignorances can be matters of non-transmittal, also perhaps the result of dual effects, but more specifically knowledge that is available in one realm of social action, but absent in another, whether by intention or not.

The question of the ontology of ignorance thus requires clarification as to a specific agnoses's relationality and epistemological features: someone somewhere knows something, someone elsewhere does not. Someone knows there is something to be known. That which is to be known may be based on probability or stochastic processes which have a residual uncertainty. These knowings and non-knowings are not patternless, but neither are they completely specified or structured.

Chronicity

The epistemological relationality of ignorance is closely paralleled by but not identical to the issues of time in assessing knowledge and agnosis. If the epistemology of ignorance is in part locative in terms of spaces (metaphoric social spaces, literal geographies), then time needs to be figured carefully in discussions of ignorance, as there are forms of agnosis which figure as the not-yet-known, and others as the forgotten or obliterated. And social power is operative in similar but

not identical ways in producing epistemological ignorances co-constituted with the production and use of ignorance over time.

To theorists such as Giddens, or Simmel, non-knowledge can only be determined in retrospect (Gross 2007). Nescience is sometimes considered the vocabulary for evaluating ignorance identified in retrospect (Knorr-Cetina 1999). But, in the same way as historians of science struggle with anachronism in attributing knowledge and non-knowledge to prior regimes of thought and connecting past to present, the problem of time in prospection and retrospection produces specific challenges of inference and attribution. Consider Simon (2002) and his account of cold fusion as an *undead science*. Cold fusion, in mainstream accounts and across much of the scientific (particularly physics) community, is dead and discredited. But it is still researched (if under a different name such as electrochemistry) and producing difficult-to-explain effects in reputable scientific labs. The possible futures of cold fusion as (in)credible knowledge produces difficulties in the present in reading its past or stating in the present what is known or unknown. This indeterminacy is a matter of epistemology over time (rather than ontology based on probabilistic uncertainty). It is also of a different kind of indeterminacy than the puzzling out of "who knew what when," in cases of negligence, or the case of tobacco company obfuscations about harm (Oreskes and Conway 2010).[2]

Granularity

Galison (2008) discusses the "classified universe" of restricted documents and the processes of classification of secret materials. His insight is the obverse of the usual "knowledge transmission" or replication questions of science studies (e.g. Collins 1992), and is instead about the mechanisms in the prevention of knowledge transmission, as well as an inquiry into what I will call the *granularity* of knowledge. Concrete, factual statements have a higher (or fine) granularity. Galison refers to specifics statements as *punctiform* which can be subject to specific forms of censorship, even though in their formulation much can be deduced that is of more theoretical or of lower (or coarse) granularity, and vice versa. The highest granularity of knowledge might be considered like Bertrand Russel and Ludwig Wittgenstein's ideas for "atomic propositions" (Galison 2008, p. 50), some smallest units of intelligible meaning. While specific statements are the most clearly identifiable, and presumably the most easily managed through censorship practices, Galison argues that the excision of punctiform or high granularity knowledge quickly expands to broad scope and impossible censorship of entire knowledge domains. Because facts are not independent of theory in any straightforward way, domains of classified documents tend to decreasing granularity (meaning broader or coarser categories). The concepts of granularity and the concept of entropy as error/ignorance are the two places this framework intersects with information theory and computing. Absent bits of information in communication streams or

storage media are discrete elements of knowledge, referred to in terms of granularity as a measure of their size.

Scale

In matters of scale, questions of agnotology need to consider both origins or causal processes, and consequences, or the reach of ignorance. If granularity refers to the size of the knowledge to be transmitted, scale refers to the components and systems in which that knowledge, whatever its granularity, might circulate. Is it an individual's knowledge, or lack thereof, that is in question, and in what relation to various other assemblages which might constitute knowledge or agnoses?

There are several research traditions focused on ignorance and error at various levels of analysis. For example, Rescher (2009) is focused on ignorance in relation to error as matters largely of cognition based in an analysis of logic from philosophy. For Rescher, ignorance is a matter of individual reasoning, and there is ample work in this area. Similarly, Watts (2011) provides a recent critique of common sense which is a popularized discussion of similar issues: the conflation of correlation and causation, the cultural and contextual specificity of common sense, and the problems of confirmatory bias and the inadequacy of folk sociology. Watts is concerned with the "inability" of social science to be predictive or to produce laws in the way that physics does (but see Cartwright 1983), but his contribution to this discussion of ignorance is his review of the systematic errors in inference produced by common cognitive processes, such as retrospective inference and confirmatory biases.

Organizational theory represents a middle-range for the exploration of ignorance, connecting individual cognition to organizational forms and processes. Bos (2007) observes that there are two frameworks for the question of stupidity and organization: "The older one claims that organization in fact needs a certain dose of stupidity and the newer one takes it that stupidity should be banned from organization." Pollitt (2000) observes that reorganization, personnel change, archival practices and changes in storage media, and organization fads produce an "organizational amnesia," a set of forgettings that lead to wheels being reinvented, an inability to learn from past lessons, inefficiencies, and ineffectiveness within organizations.

Vaughan (1999) and of course Perrow (1984) (and back to Merton and Weber) argue that all organizational forms have pathologies. Vaughan's perceptive analysis of mistake, misconduct, and disaster points to the communication components of ignorance, that is, that organizations produce ignorance, and thus the possibility of mistakes, through compartmentalization and structural secrecy. But there are other structural components, too. For example, centralization has its trade-offs; routine-following can produce error through oversubscription or misapplication of rules even as routines reduce variability, discretion, and some other sources of error. In addition, Vaughan notes that "all judgments are made

under conditions of imperfect knowledge, thus routine non-conformity is a normal by-product of techno-scientific work" (1999, p. 279).

The framework for understanding organizations and ignorance can be extended through the examination of organizational cultures, such as described by Eden (2004) or Vaughan (1996), where intra-organizational process lead to blind spots, and prioritizations of data, and intra- and inter- organizational competition for resources and prestige lead to ignorances of omission or distortion. For example, Eden (2004) examines the lack of knowledge of fire effects from nuclear weapons as a matter of professionals and organizations focusing on what they do well and excluding that which eludes them, leading to substantial misrepresentations of the world in which they work. In Eden's analysis, the agnosis about fire-effects after nuclear detonation led to a mass overproduction of strategic nuclear weapons. In the case of post-Katrina environmental contamination, testing protocols are sedimented into disciplinary regimes and organizational practices producing ignorance about ecological and sociohistorical contexts, and thus misrepresenting the distribution of risks across the landscape (Frickel and Vincent 2007).

And of course there are ignorances in a broader scale, wrapped up in economic, political, cultural, and ideological processes. As Hess (2009) articulates "social change agents face … an often lopsided field of scientific research" (p. 306). Social movements often confront an area of "undone science" which would be useful to them, but remains underfunded. His study of civil society research, such as environmental non-government organizations (NGOs) providing research reports in support of movement goals, suggests an alternative to traditional routes for research agenda setting in science, which are dominated by for-profit and government funding organizations. Similarly, Oudshoorn (2003) and Daniels (2006) both provide case studies which examine the ways in which configurations of masculinity have lead to a lack of technological development of male birth control options for the former, and a lack of research on male reproductive health, particularly its environmental constituents, for the latter. Proctor's work (1995) is concerned with the politics and economics of cancer research shaping what is known and unknown, as the project of "curing cancer" has far more prestige and resources in relation to the project of "preventing cancer."

And finally, there are the frameworks which articulate deep epistemological rifts in knowledge, such as Sedgewick's (1990) analysis of the ways in which the homo/heterosexual binary produces non-knowledges that shape understandings of sexuality and subjectivity. And while Foucault rarely mentions ignorance or non-knowledges explicitly, his archaeologies and genealogies are rife with examples of things/bodies/identities elided by epistemological formations. Similarly Butler's (1993) conception of the abject, while not specifically about ignorance per se, suggests the production of zones of unintelligibility where might be found that which escapes, exceeds or is cast out of normative modes of being/knowledge.

Scholars from postcolonial studies (Santos 2008) and critical race theory (Mills 2008) provide examples of epistemological ignorances at broad scale, in the impossibility of knowing the "Other," particularly under conditions of subjugation.

Marx's dialectics of the master–slave relationship inform feminist theory (De Beauvoir 1949/2009), colonial relations (Fanon 1952/2008), and black feminist thought (Collins 2000); in that, the subordinated can and must have knowledge of the master (as a matter of survival), who cannot have, and cannot be interested in (for that would require recognizing the humanity of the other), knowledge of the subjected. Other postcolonial theorists (Said 2003) similarly articulate the production of ignorance in disciplinary and popular representations of "others" under colonial relations. So one of the major attributes of ignorance requiring articulation is the matter of scale, examining processes by which knowledge and agnoses are constituted across assemblages based on size and complexity and overdetermined by power relations.

Intentionality

Beck (2007, p. 126) develops a typology which focuses on the intentionality of the knower: willful ignorance in relation to a conscious inability to know (we know we don't know). The next type is the unconscious non-knowing that "does not reflect on its own limits" and finally the unknown unknown, which provides the "element of surprise." Beck uses as an example the willful ignorance of denying the effects of global climate change to discuss "side-effects" as things that might be unknown, but when known and not acted upon can intensify the effects the system producing the (side-)effects.

There are numerous examples of intentionally produced agnoses. Tuana's (2008) analysis of the erasure of knowledge about female orgasm and the structure and function of the clitoris, or Schiebinger's (2004) study of the non-transmission of knowledge of the abortifacient properties of bird of paradise plants from colonial contexts to the metropoles of the "long 18th century" are examples where race, gender, and culture produce absences of knowledge through non-transmittal. Adrienne Mayor (2008) describes the suppression and neglect of Native American and related indigenous groups paeleontological knowledge of fossils as a result of colonizer's dismissal of native knowledges as mere myths and legends of barbaric others. Moore and Tumin (1949) posited the functionality of ignorance, for example in preserving privileged positions such as between experts and consumers or competitors. Their framework is ambivalent about the relationship between function and intention—most of their examples, such as producing anxiety about performance through withholding feedback to spur greater productivity in competitive arenas (pp. 793–4), suggest the production and maintenance of ignorance can be an organizational or interpersonal strategy.

Dismissals and suppressions of knowleges are not identical with the production of falsehoods as non-knowledges, such as fraud, hoaxes, propaganda (Bernstein 2009a, 2009b), which are intentional distortions of knowns, although they may be similarly motivated by a multiplicity of factors linked together by considerations of social power. Thus, ignorance has its uses, as the utility of

non-knowledge is produced in relation to the intention of its locutors. For example, the sites of the Salem witch trials in 17th century New England were effaced, as are many locations of violent crime, primarily in shame (Foote 1990).

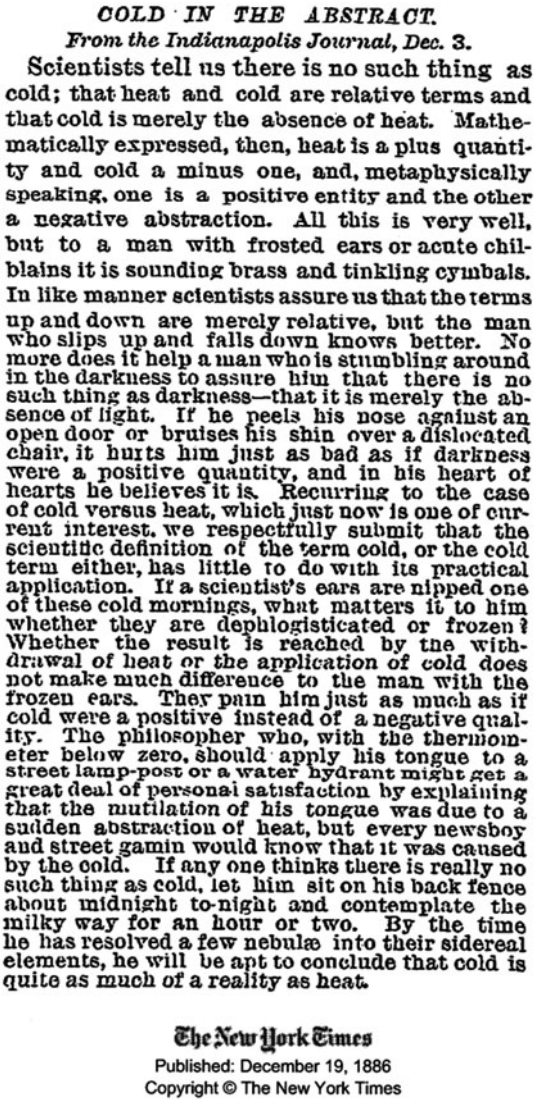
Social conventions, particularly around privacy and politeness (Smithson 2008), produce intentional nondisclosures, whether they are of the "too much information" variety, or things we really do not want to know about or disclose to our conversational partners and mere acquaintances. Surprise parties require withholding information, although revealing the ending of a story does not necessarily mean ruining it (Leavitt and Christenfeld 2011). Frickel and Vincent (2007) discuss strategic not-wanting-to-know with regard to Hurricane Katrina, as real estate values and environmental justice outcomes will be shaped by the potential (non) identification of toxic accumulations in the soil.

Ignorance is useful. Bernstein (2009a, 2009b) reminds us that non-knowledge and nonsense is frequently found in the realm of literature and philosophy, such as in the works of Georges Bataille (2001). The productive nature of non-knowledges is identified in surrealism, for creativity and spiritual enrichment, and for innovation. Knorr-Cetina identifies *nichtwissen* as knowledge where the limits of knowledge are important to future action and planning, as opposed to negative knowledge which is a deliberate choice not to engage knowledge in a particular direction (as it is presumed to be unimportant) (Gross 2007, 749). Smithson (2008) reminds us that some form of ignorance is necessary for creativity and problem solving. The production of ignorance is part of the work of ideologies and propaganda, and to conspiracy theorists, a necessity for the ever-oppressive state. So perhaps a refinement of the Enlightenment dictum that *knowledge is power*, already turned on its head by Foucault's power/knowledge formulation, might be achieved by considering power/agnosis in its various manifestations.

With the properties of chronicity, scale, granularity, ontology, and intentionality as ways of describing ignorances, we are in a better position to consider a broader range of comparisons across case studies, and to include the dynamism and relationality that undergirds many, but not all, forms of ignorance. Further refinement to our consideration of ignorance has to do with its points of connection to interdisciplinary scholarship on absences.

Absences, More Generally

Figure 1 is an editorial clipped from the 19 December 1886 *New York Times*, reprinted from the *Indianapolis Journal* from 3 December of that year. It encapsulates for us two important issues in study of absences in general and ignorance in particular, the issue of privatives, and the issue of symmetry. Coldness, and darkness or silences, are understood scientifically as privatives—as negative abstractions rather than positive entities. As noted in the figure, these abstractions, while nice in theory, are irrelevant to the person with their tongue stuck to the flagpole or stumbling around in the dark.[3] Embedded within this clipping are issues



COLD IN THE ABSTRACT.

From the Indianapolis Journal, Dec. 3.

Scientists tell us there is no such thing as cold; that heat and cold are relative terms and that cold is merely the absence of heat. Mathematically expressed, then, heat is a plus quantity and cold a minus one, and, metaphysically speaking, one is a positive entity and the other a negative abstraction. All this is very well, but to a man with frosted ears or acute chilblains it is sounding brass and tinkling cymbals. In like manner scientists assure us that the terms up and down are merely relative, but the man who slips up and falls down knows better. No more does it help a man who is stumbling around in the darkness to assure him that there is no such thing as darkness—that it is merely the absence of light. If he peels his nose against an open door or bruises his shin over a dislocated chair, it hurts him just as bad as if darkness were a positive quantity, and in his heart of hearts he believes it is. Recurring to the case of cold versus heat, which just now is one of current interest, we respectfully submit that the scientific definition of the term cold, or the cold term either, has little to do with its practical application. If a scientist's ears are nipped one of these cold mornings, what matters it to him whether they are dephlogisticated or frozen? Whether the result is reached by the withdrawal of heat or the application of cold does not make much difference to the man with the frozen ears. They pain him just as much as if cold were a positive instead of a negative quality. The philosopher who, with the thermometer below zero, should apply his tongue to a street lamp-post or a water hydrant might get a great deal of personal satisfaction by explaining that the mutilation of his tongue was due to a sudden abstraction of heat, but every newsboy and street gamin would know that it was caused by the cold. If any one thinks there is really no such thing as cold, let him sit on his back fence about midnight to-night and contemplate the milky way for an hour or two. By the time he has resolved a few nebulæ into their sidereal elements, he will be apt to conclude that cold is quite as much of a reality as heat.

The New York Times

Published: December 19, 1886

Figure 1 "Cold in the Abstract:" Lay vs. Professional Understandings of Temperature.

concerning the public understanding of science, particularly invoking a problem of symmetery (discussed below). Considering forms of ignorance that are matters of absence calls us to think about the problems of absences more generally. As with ignorance, the possibility of cross-cultural and cross-disciplinary studies of absence is rather daunting. For example, Portuguese speakers have the term *saudade*, which is a feeling of nostalgic longing for that which is lost. Derrida (1994) coined the term *hauntology* to describe a nostalgia for an imagined past and the ways in

which Marxism will continue to haunt the West. Baudrillard (1994) describes the *simulacrum* as the copy for which there is no original. Both hauntology and simulacrum are both taken as pejorative, in some way inauthentic even as there is no "real" referent which is doing the haunting or is the original for the simulation. The negative connotation of inauthenticity is challenged by Deleuze and Guattari (1987) in positing a "double becoming" of both the referent and the simulation, both as productions of culture-machines. These multiple valences of positive and negative valuation—is it real? Does it matter?—add to the complexity of studying absences.

The first point of contact between agnotology and studies of absence I will explore is the question of the privative, a specific form of absence in relation to a known presence. The privative, as a specific kind of absence, encapsulates a number of problems for the social study of ignorance and absences particularly vividly. I will explore various modalities of absence that have been studied across disciplines, focusing on silence and invisibility as key sensory systems from which things might go unperceived. Then finally this section will interrogate the problems of stupidity and symmetry, each being special problems at the intersection of agnotology and absence.

Privatives and Absences

The Buddhist term, *avidyā,* is exactly a privative, specifically an *alpha privative* formed by the addition of an *a*-prefix. This term reflects the inherent limitations in human knowledge, and is not a lack of knowledge or scholarship, per se, but a lack of the knowledge of *being*, and as such the foundation for human misery. But our concern here, besides a cross-cultural interest in a consequence of ignorance, is the formulation of the negation. As a privative, *avidyā* is specifically formulated as an absence of an available (if difficult to achieve) knowledge. Of course as linguistic constructions, agnosis and agnotology are thus alpha privatives, as is absence.

Why should we care if people misunderstand privatives such as cold? Consider the general "misunderstanding" of how thermostats work. If a house is chilly, the thermostat need only be set to the desired temperature plus maybe one degree. Many, many people, however, add 10 degrees with the idea that the house will heat faster. Most people treat their thermostat as the setting to a pump, which at a higher setting will pump more heat into the house. This is not how they work. This leads to measurable waste in energy as the furnace will overshoot the desired end temperature, running for longer than necessary. Or consider variations on the joke that circulates about trying to puzzle out how a thermos knows whether to keep its contents hot or cold. That "misunderstanding" can only come from misunderstanding the properties of the vacuum in the walls of the thermos, and the properties of temperature in materials. This misunderstanding is a form of ignorance: individually enacted within a cultural context, but it is not an absence

of knowledge per se as it does encapsulate a folk model of physics. It is ignorance *about* a privative, not a privative in itself.

Ignorance may be the privative of knowledge, or, more specifically, certain kinds of ignorance are the privative of knowledge, while others are not, and this distinction is important. Privative forms of ignorance should then be amenable to the same kinds of analysis as other forms of absences, and vice versa, while ignorances that are not the result of an absence but of various forms of misinformation or error require slightly different analytic considerations.

Theories and Modalities of Absences: Silences and Invisibilities

The analysis of things absent to two of our senses, sight and hearing, produce much of the scholarship on absences.[4] There are various forms of silences and silencing practices. There are, as Bourdieu (1977) notes, the "things that go without saying," the *doxa* which limit thought, action, and social mobility. There are things unspeakable and forbidden, explicitly through censorship and social convention, and there are the things discursively "unthinkable" and thus "unspeakable" inhabiting abject spaces. Open secrets (Sedgewick 1990) are those things that everyone knows but must not be said, in contrast with what Bourdieu calls the *complicitous silence* (1977, p. 188), the silence that sustains ideologies. Speech withheld, whether refusing interpellation or in other forms of resistance has revolutionary potential, and yet speech withheld has been identified as "reactionary" in certain contexts (Habermas 2002, p. 67). This points to a relational quality to absences, as absences *from* one domain in relation to another—a question of the ontology and epistemology of an absence as well that absence's consequences.

Besides being silent, things can be invisible. We know that there are invisible colleges, that the poor are rendered invisible in public life and media, that transgendered people are invisible, and many other kinds of bodies are unseen in public discourse. Secrets, considered either as unspoken words or non-disclosed representations are situated at an awkward nexus of individual "rights" to privacy, at least for those able to protect personal information as property, and the need for transparency (e.g. visibility) as a part of the social contract of contemporary public life in liberal democracies (Harris 2009).

Casper and Moore (2009) articulate the ways in which bodies can be invisible, as matters of representation, or figure as missing in more literal ways. Calling for an ocular ethic to complement Rose's (2008) somatic ethic, Casper and Moore (2009) ask us to consider why some bodies are valued for their invisibility, and others valued for their hypervisibility. Similarly, Gordon recognizes "(v)isibility is a complex system of permission and prohibitions, of presence and absence, punctuated alternately by apparitions and hysterical blindness" (1996, p. 193). Like Rapp (2000) and the concept of stratified reproduction, Casper and Moore suggest that complex webs of valuation, most evidently by sex/gender, sexuality, race, and class, but also by perceived ability, attractiveness, and other ascribed and achieved

characteristics are tied to processes of valuation of bodies in relation to their potentials for representation, and their capacity for sustaining existence.

As a postcolonial scholar Santos (2008, p. 238) argues that several logics undergird the production of non-existence: "Non-existence is produced whenever a certain entity is disqualified and rendered invisible, unintelligible, or irreversibly discardable. What unites the different logics of production of non-existence is that they are all manifestations of the same rational monoculture." Here tying non-existence to ignorance, Santos argues that the Western monoculture of knowledge with the elevation of science as the sole arbiter of knowledge produces "non-existence… in the form of ignorance or lack of culture" (2008, p. 238). The other logics include the monoculture of *linear time* and of *classification* which naturalizes differences and hierarchies, of privileging the global and erasing the local; and the logic of *productivity* which privileges growth and market logics. Santos argues these forms of are "forms of non-existence produced by hegemonic epistemology and rationality" to be confronted by a sociology of absences (2008, p. 239).

Looking briefly at silence and invisibility, the properties of scale, granularity, chronicity, ontology, and intentionality that provide a framework for comparing and contrasting studies of ignorance can similarly organize and inform studies of absences. These are not identical mappings, however, and each produces problems related to symmetry, formulated as epistemological (Collins 1981), methodological, Bloor (1976) or the generalized symmetry of Latour (1992).

Symmetry and Stupidity

Bernstein (2009a, 2009b) argues for a symmetric approach to the categories of knowledge and non-knowledge, despite the argument by Bos (2007) who considers stupidity "an independent quality with a logic all its own" (2007, p. 147), similar to Boxsel (2003). For example, "Terms associated with knowledge at all levels can usually be matched with approximate counterparts in the domain of nonknowledge" (Bernstein 2009a, p. 27). However, Tuana (2008, p. 110) warns that "while the movements and productions of ignorance often parallel and track particular knowledge practices, we cannot assume that their logic is similar to the knowledges that they shadow." Bernstein's goal is a classificatory one in support of libraries and their need to order knowledges: Where would knowledge about non-knowledges be classified?

Ignorance may be useful, or may have a socially or psychologically adaptive mechanism and much the same can be said for stupidity: "All our organizations work by virtue of stupidity. Our world revolves around fantasies and around fools who believe in them. Stupidity is useful." (Boxsel 2003, p. 43). However, both ignorance and stupidy are often taken as problematic, with stupidity in particular framed as non-knowledge that is self-defeating (Wells 1986). "Stupidity is the talent of acting unwittingly against your own best interests, with death as the ultimate consequence" (Boxsel 2003, p. 31).

Garcia (1997) also points to a potentially moral dimension to ignorance—ignorance in decision processes can be an indication of choosing stupidity thus or by avoiding responsibility. Burt (2005, p. 30) describes how public attribution of stupidity, particularly in public political discourse has the effect of "an advanced Orwellian double-speak in which the stupid masquerades as the smart, the zealot as the skeptic." Public attributions of stupidity, then, are political. Take for example a recent argument that young people are too stupid to vote, or other vitriolic exchanges of attributions of stupidity[5] in the public sphere. The role of social power in attributions of stupidity, and as one of the objectives of those attributions, points to a challenge to symmetry in the study of ignorances and absences.

The conventional model of analyzing lay or public understandings of science, identified as the "deficit model" can be criticized for treating lay non-use of canonical science as matters of absence, a deficit, or as matters of distortion (Wynne 1995). Consider again, the newspaper clipping from Figure 1. How might the difference between public understandings of cold, and thermodynamic understandings of cold be treated symmetrically, especially when in this context they have approximately the same behavioral outcome: do not stick your tongue to freezing cold metal posts.

As Christensen (2008) notes, "symmetry" as a journalistic norm for reporting "both sides" of a controversy can produce ignorance as equal weight ends up given to knowledge statements either intentionally misleading or otherwise marginal or discreditable. "Knorr-Cetina and I [Michael J. Smithson] have accurately identified the main problem here, namely that anyone referring to ignorance cannot avoid making claims to know something about who is ignorant of what." (Smithson 2008, p. 210). High, Kelly, and Mair (2012) are not concerned with knowledge gaps as recognized or adjudicated by social science analysis. Instead, they focus on ignorances that are culturally recognized by participants. As anthropologists, they claim there is little to be done to draw universal conclusions about ignorance or its relations to "comparable phenomena such as stupidity, error, and confusion" (High, Kelly, and Mair 2012, p. 17).

In the sociology of scientific knowledge, Bloor's argument (1976) for symmetry in the sociological explanation true and false beliefs helped shepherd transformations of social studies of science. Symmetry is similarly demanded of actor-network theory, although the methodological principle is that the distinction between the technical and the social (or political) is an outcome of actor's articulations and not an a priori attribution. However, through the ostensible collapse of the social (Latour 2007) as an explanans, there still remains the problem of sorting out whether or not the network and assemblages are the explanans or the explanandum, assuming explanation is in fact the goal of agnotology and related studies of absences.

Conclusions: Studying Things That Aren't There

> Absence is therefore not just a theoretical concept implied as the default logical antonym to presence; it is also a corporeal, emotional and sensuous phenomenon articulated in discretely concrete, political, and cultural registers (Bille et al. 2012, p. 12).

The projects of agnotology and absence (should that be absentology?) require a great deal of taxonomic work, and this paper is meant to add to the conversation, not as a matter of lexical policing, but as a necessary step in theory-building and developing the capacity for cross-case comparisons in studies of ignorance, as well as to articulate a possible framework for studies of other kinds of absences. Unpacking the distinctions within the framework of agnotology provides insight into the multiple forms of ignorance, especially those which are indeed forms of absent knowledge. This provides a way of interrogating things that are absences more generally, illustrating some particular challenges for the social studies of science and knowledge. For example, identifying an agnosis, especially but not solely privative agnoses, requires a suspension of traditional epistemological symmetry. Like the case of the scientific understanding of cold as the absence of heat rather than a substance in itself, the identification of things as privatives, or identifying ignorances as either absences or misunderstandings requires claiming positionality as to knowing the properties of the primary referent or elemental "truth"—identifying the *gnosis* to which the *a-* might be attached.

Full exploration of the challenges to symmetry will need to be taken up elsewhere, but it is clear that strict epistemological symmetry generating sociological explanations for both "true" and "false" beliefs cannot hold in studying either ignorance or absences. And Latour's generalized symmetry which eschews social causes for explanation similarly cannot hold: each perhaps is to be replaced by a more modest methodological toolkit which maintains integrity across comparable levels of analysis in various case studies. We do not want to return to the pre-Bloor (1976) days of explaining "false beliefs" with sociological explanations and apparently "true beliefs" with "just so stories," reducing the power of science studies as an explanatory project to descriptive muck-raking journalism.

Methodology

Like physicists who study black holes by their effects, sociologists and other theorists have an emerging repertoire for studying absences. A black hole is not visible, although it is not absent, and its effects on light and nearby masses are measurable. Vacuums are an absence of matter in space, and while not an object of study in themselves, as an absence in which things might be made present vacuums highlight properties of those things: the properties of light in a vacuum, for example. Gordon (1997/2008) adopts the term hauntology to describe the ways that various kinds of absences linger and trouble discourses as present absences. Slavery in the America or the disappeared in Argentina are both absences (missing

persons) and knowledge about those made absent. These haunt rationality and consciousness, both subjective and public: hauntings are analyzed through their a/effects. Structural holes (Burt 1995) are absences in a network or between networks. They are measurable as network phenomena: nodes or linkages that might be expected given the all mathematically possible connections in a network but are not present. These absent network features need to be explained, as does the eventual aperception and capitalization of these absences by participants in the network, and the lack of perception of the possibilities of structural holes by other participants.

In their theory of knowledge and culture, Deleuze and Guattari (1987) suggest the metaphor of the rhizome as a new model of knowledge and subjectivity, as a poststructuralist orientation that does not reproduce dichotomies of knowledge/power. They specifically oppose the rhizome, think bamboo and its structure and proliferation, to the tree, as a model of knowledge. The rhizomic principles of (1 and 2) connection and heterogeneity and (3) multiplicity, means in their perspective that rhizomes are understood to be epistemically flat, like Latour's (2007) assemblages and networks. We might think of rhizomes through a fourth principle, what Deleuze and Guattari frame as the asignifying rupture, a way of tracing knowledges as de- and re-territorializations that are "drawings in" of features. With this "drawing in" knowledges are more than simple additive collections. Deleuze and Guattari also suggest what they call aparallel evolution as their fifth and sixth principles, proposing cartography and decalcomania (a form of tracing). That is, there is no regularity in the reproduction of rhizomic extensions, and rather than representational maps knowledge should be conceived of as nonrepresentational tracings. (See, e.g. maps of the London underground.) This is articulated in Barad (2007) as a post-representationalist theory of performance and functionality in knowledge production.

However, these are theories of knowledge, and ignorance and absence are themselves absent from Deleuze and Guattari's method. I argue that the tracings of rhizomes nonetheless produce spaces between the lines of the rhizome or the tracings of routes as empty and as potential agnoses. In addition, they argue that rhizomes are non-hierarchical and antigeneaological that there is no deep structure to knowledges and that "the rhizome connects any point to any other point" (2007, p. 21) and the rhizome is not "overcoded." However, rhizomes do have dimension, length, and mass. They are not, themselves, structureless, nor are the spaces between: there is a measure of granularity. This suggests that a fractal or holographic metaphor may be more apt than that of the rhizome: that the structure of the macro is reproduced through diminishing scale (or vice versa), or that the whole is present, even if at degraded resolutions, in the parts and fragments. Similarly, like the network theory underpinning structural holes, Deleuze and Guattari make the assumption that all network relations—or rhizomes—are equally possible, which may be mathematically true. Thus, what explains the lack of rhizomes or network positions or knowledge that might have otherwise been expected in a fully articulated network?

Along with these suggestive models and metaphors, there are caveats for an emerging methodology of the sociology of absences. For example, Collins (2007) warns against the use of counterfactuals as methodology for historiography or historical sociology. This "thought experiment" is the projection of the presence or absence of a person, place, thing or specific event changing "the course of history." Collins finds the use of counterfactuals to interrogate historical events as misrepresenting historical causality and the scale and scope of historical forces. To shift the frame slightly to apply to a methodology for absences, looking for absences as causal features of social life must be done carefully to avoid anachronistic fallacies and related logical errors produced by counterfactual thinking.

Two other hesitations warrant consideration at this time for our emerging methodology for the analysis of ignorance: the first is the aphorism that "absence of evidence is not evidence of absence." Like black swans and other absences, the not-yet-ness of evidence challenges easy attribution of knowledge and non-knowledge. Originally appearing in print to justify long term investment in searches for extraterrestrial intelligences, the aphorism is considered a logical fallacy and is frequently deployed to shift the burden of proof.[6] For example, for the stereotypical conspiracy theorist, the absence of evidence for conspiratorial activities is taken, at face value, as evidence *of* the conspiracy. The second problem not easily resolved is the matter of imputation: based on the presumed inaccessibility of others' minds, our agnoses of each other's motives, the imputation of intentionality, while an important dimension of the politics of agnotology and absence, is a fraught project. What would a "symmetric" analysis of these attributions of knowledge and motive to others in the absence of evidence look like?

What do We Know about Ignorance and Absence?

Ignorances can be distinguished by kind, and by degrees, requiring attention to the factors identified above as granularity, chronicity, scale, intentionality, and ontology. Some forms of ignorance are absences, some errors, and those that are privatives can benefit from some of the theoretical and methodological resources from fields concerned with the identification and study of absences. And conversely applying ideas, such as granularity, intentionality, ontology, chronicity, and scale can inform inquiries into the production and structuration of absences. Not every one of these properties will be of the most analytic or political interest for making cross-case comparisons, but these properties provide some traction in theorizing agnoses and absences.

While physicists worry about their "theory of everything" and the integration of general relativity and quantum physics remains elusive (itself a form a disciplinary specified ignorance which is epistemological and of low granularity), what I propose is the articulation of the sociology of nothing,[7] or a project similar to that of agnotology which will articulate methodological parameters necessary for studying things that are not there. What do we know about the things that are not

there?: that they can take many modalities based on their absence from our senses and discursive practices; that they are constituted in systems of stratification and valuation which render these absences (il)legible; that they are institutionalized; and that we can study them by their effects, ever attentive to the complexity of inferences about absences.

By moving back and forth between ignorance and absence many of the conceptual tools for studying agnotology may help to shape a framework for connecting the diverse studies of absence and its causes, and the studies of absence illuminating studies of ignorance, particularly those forms of ignorance which are absences, especially privative agnoses. Moving back and forth between the two, we will need to remind ourselves that ignorance and absence are produced, and productive, situated in time and reflecting the regimes of knowledge and legibility that constitute an episteme.

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Notes

[1] Oops. When this was first finished in June 2012, that was still a meaningful question, which as of July 2013 leads us into the issue of chronicity discussed below.

[2] Ignorance in time or space is what makes mystery writing work. Someone, if no one else but the author, knows "who done it," while some combination of characters and the reader may or may not be in on the secret, creating suspense. Similarly, most but not all stage magic works through withholding information—how did they do that?—in conjunction with distraction and dissembling.

[3] Fantasist Terry Pratchett writes of darkness, and silence, as positive quantities with specific properties: "Old Tom" the bell tolls silences on the hour: see Pratchett (1990), for other literalizations like this.

[4] This reflects the primacy of sight in Western epistemology, with sound a close second. Smell, touch, and taste require extensive articulation in speech or text to communicate and circulate as knowledge.

[5] For an example of these kinds of attributions: http://dailycaller.com/2012/05/12/jonah-goldberg-young-people-are-so-frickin-stupid-video/; and Moore (2002), vs. Hardy and Clark (2005).

[6] This is attributed to astrophysicist Martin Rees and appears in print by Carl Sagan (1995).

[7] This sociology of nothing is different from but not incompatible with Ritzer's (2003) "Globalization of Nothing," which is a critique of global commodity fetishism and its

intentional stripping of meaning from products for mass consumption. The stripping away of local meanings is a kind of ignorance production, constituting an agnosis which allows commodities to circulate without controversy—see also Santos (2008).

References

Barad, Karen. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Durham, NC: Duke University Press.

Bataille, Georges. 2001. *The unfinished system of nonknowledge*. Translated by Stuart Kendall and Michelle Kendall and edited by Stuart Kendall. Minneapolis: University of Minnesota Press.

Baudrillard, Jean. 1994. *Simulacra and simulation*. Translated by Sheila Glaser. Ann Arbor: University of Michigan Press.

Beck, Ulrich. 2007. *World at risk*. Cambridge: Polity Press.

Bernstein, Jay. 2009a. Nonknowledge: The bibliographical organization of ignorance, stupidity, error, and unreason: Part one. *Knowledge Organization* 36 (1): 17–29.

Bernstein, Jay. 2009b. Nonknowledge: The bibliographical organization of ignorance, stupidity, error, and unreason: Part two. *Knowledge Organization* 36 (4): 249–60.

Bille, Mikkel, Frida Hastrup, and Tim Flohr Sorensen, eds. 2012. *An anthropology of absence: Materializations of transcendance and loss*. New York: Springer.

Bloor, David. 1976. *Knowledge and social imagery*. Chicago: University of Chicago Press.

Bos, Rene ten. 2007. The vitality of stupidity. *Social Epistemology* 21 (2): 139–150.

Bourdieu, Pierre. 1977. *Outline of a theory of practice*. Cambridge: Cambridge University Press.

Boxsel, Mathhij van. 2003. *The encyclopedia of stupidity*. Translated by Arnold Pomerans and Erica Pomerans. London: Reaktion.

Burt, Ronald. 1995. *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Burt, Richard. 2005. Stupid shit: (In)security in the age of twilightenment. *ArtUS* 11: 29–37.

Butler, Judith. 1993. *Bodies that matter: On the discursive limits of 'sex'*. New York: Routledge.

Cartwright, Nancy. 1983. *How the laws of physics lie*. Oxford: Oxford University Press.

Casper, Monica, and Lisa Jean Moore. 2009. *Missing bodies: The politics of visibility*. New York: NYU Press.

Christensen, Jon. 2008. Smoking out objectivity: Journalistic gears in the agnogenesis machine. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Chap. 12, pp. 266–282. Stanford: Stanford University Press.

Collins, H. M. 1981. Introduction: Stages in the empirical programme of relativism, special issue: knowledge and controversy: Studies of modern natural science'. *Social Studies of Science* 11 (1): 3–10.

———. 1992. *Changing order: Replication and induction in scientific practice*. Chicago: University of Chicago Press.

Collins, Patricia Hill. 2000. *Black feminist thought*. New York: Routledge.

Collins, Randall. 2007. Turning points, bottlenecks, and the fallacies of counterfactual history. *Sociological Forum* 22 (3): 247–69.

Daniels, Cynthia R. 2006. *Exposing men: The science and politics of male reproduction*. New York: Oxford University Press.

De Beauvoir, Simone. 1949/2009. *The second sex*. London: Cape Publishing.

Deleuze, Gilles, and Felix Guattari. 1987. *A thousand plateaus: Capitalism and schizophrenia*. Translated by Brian Massumi. Minneapolis: University of Minnesota Press.

Derrida, Jacques. 1994. *Specters of marx: The state of the debt, the work of mourning & the new international*. Translated by Peggy Kamuf. New York: Routledge.

Eden, Lynn. 2004. *Whole world on fire: Organizations, knowledge, and nuclear weapons devastation*. Ithaca, NY: Cornell University Press.

Fanon, Frantz. 1952/2008. *Black skin, white masks*. New York: Grove Press.

Foote, Kenneth. 1990. To remember and forget: Archives, memory, and culture. *The American Archivist* 53 (3): 378–92.

Frickel, Scott, and M. Bess Vincent. 2007. Katrina, contamination, and the unintended organization of ignorance. *Technology in Society* 29: 181–8.

Galison, Peter. 2008. Removing knowledge: The logic of modern censorship. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Chap. 2, pp. 37–54. Stanford: Stanford University Press.

Garcia, Gregory Norton. 1997. Why we choose to be stupid. Ed. D. diss., Montana State University, Bozeman.

Gordon, Avery. 1997/2008. *Ghostly matters: Haunting and the sociological imagination*. Minneapolis: University of Minnesota Press.

Gross, Matthias. 2007. The unknown in process; dynamic connections of ignorance, non-knowledge, and related concepts. *Current Sociology* 55: 742–759.

———. 2010. *Ignorance and surprise: Science, society, and ecological design*. Cambridge, MA: MIT Press.

Habermas, Jurgen. 2002. Transcendence from within, transcendence in this world. In *Religion and rationality: Essays on reason, god, and modernity*, edited by and introduction by Eduardo Mendieta, pp. 67–94. Cambridge, MA: MIT Press.

Hardy, David T., and Jason Clark. 2005. *Michael Moore is a big fat stupid white man*. New York: William Morrow.

Harris, Verne. 2009. Against the grain: Psychologies and politics of secrecy. *Archival Science* 9: 133–142.

Hess, David. 2009. The potentials and limitations of civil society research: Getting undone science done. *Sociological Inquiry* 79 (3): 306–327.

High, Casey, Anne Kelly, and Jonathan Mair. eds. 2012. *The anthropology of ignorance: An ethnographic approach*. New York: Palgrave Macmillan.

Jacklin, Angela, Carol Robinson, and Harry Torrance. 2006. When lack of data is data: Do we really know who our looked-after children are? *European Journal of Special Needs Education* 21: 1–20.

Kerwin, Ann. 1993. None too solid: Medical ignorance. *Knoweldge: Creation, Diffusion, Utilization* 15 (2): 166–185.

Knorr-Cetina, Karin. 1999. *Epistemic cultures; How the science make knowledge*. Cambridge, MA: Harvard University Press.

Latour, Bruno. 1992. One turn after the social turn. In *The social dimensions of science*, edited by E. McMulin, pp. 272–294. Notre Dame, IN: Notre Dame University Press.

———. 2007. *Reassembling the social: An introduction to actor-network theory*. New York: Oxford University Press.

Leaveitt, Jonathan, and Nicholas J. S. Christenfeld. 2011. Story spoilers don't spoil stories. *Psychological Science* 22 (9): 1152–1154.

Machlup, Fritz. 1980. *Knowledge: Its creation, distribution, and economic significance. Vol. I. knowledge and knowledge production*. Princeton, NJ: Princeton University Press.

Mair, Jonahtan, Ann. H. Kelly, and Casey High. 2012. Introduction: Making ignorance an ethnographic object. In *The anthropology of ignorance: An ethnographic approach*, edited by Casey High, Ann. H. Kelly, and Jonathan Mair, pp. 1–32. New York: Palgrave Macmillan.

Mayor, Adrienne. 2008. Supression of Indigenous Fossil Knowledge: From Claverack, New York 1705 to Agate Springs, Nebraska, 2005. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Chap. 7, pp. 163–182. Stanford, CA: Stanford University Press.

Merton, Robert K. 1987. Three fragments from a sociologist's notebooks: Establishing the phenomenon, specified ignorance, and strategic research materials. *Annual Review of Sociology* 13: 1–28.

Michaels, David. 2008. Manufactured uncertainty: Contested science and the protection of the public's health and environment. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, pp. 90–107. Stanford, CA: Stanford University Press.

Mills, Charles. 2008. White ignorance. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Chap. 10, pp. 230–249. Stanford, CA: Stanford University Press.

Moore, Michael. 2002. *Stupid white men*. New York: Harper.

Moore, Wilber E., and Melvin M. Tumin. 1949. Some social functions of ignorance. *American Sociological Review* 14 (6): 787–795.

Oreskes, Naomi, and Erik M. Conway. 2010. *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. London: Bloomsbury Press.

———. 2008. Challenging knowledge: How climate science became a victim of the cold war. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor, and Londa Schiebinger, Chap. 3, pp. 55–89. Stanford, CA: Stanford University Press.

Oudshoorn, N. 2003. *The male pill. A biography of a technology in the making*. Durham: Duke University Press.

Perrow, Charles. 1984. *Normal accidents: Living with high risk technologies*. Princeton, NJ: Princeton University Press.

Pollitt, Christopher. 2000. Institutional amnesia: A paradox of the 'information age'? *Prometheus* 18 (1): 6–16.

Pratchett, Terry. 1990. *Eric*. London: Transworld/Corgi Press.

Proctor, Robert N. 1995. *Cancer wars: How politics shapes what we know and don't know about cancer*. New York: Basic Books.

Proctor, Robert N., and Londa Schiebinger. 2008. *Agnotology: The making and unmaking of ignorance*. Stanford, CA: Stanford University Press.

Rapp, Rayna. 2000. *Testing women, testing the fetus: The social impact of amnicentesis in America*. New York: Routledge.

Ravetz, Jerome R. 1993. The sin of science: Ignorance of ignorance. *Knowledge: Creation, Diffusion, Utilization* 15 (2): 157–65.

Rescher. 2009. *Ignorance: On the wider implications of deficient knowledge*. Pittsburgh, PA: University of Pittsburgh Press.

Ritzer, George. 2003. The globalization of nothing. *SAIS Review* 23 (2): 189–200.

Rose, Nikolas. 2008. The value of life: Somatic ethics & the spirit of biocapital. *Daedelus* 137 (1): 36–48.

Sagan, Carl. 1995. *The demon-haunted world: Science as a candle in the dark*. New York: Ballantine/Random House.

Said, Edward. 2003. *Orientalism*. New York: Vintage.

Santos, Boaventura de Sousa. 2008. The world social forum and the global left. *Politics & Society* 36 (2): 247–70.

Schiebinger, Londa. 2004. *Plants and empire: Colonial bioprospecting the the atlantic world*. Cambridge, MA: Harvard University Press.

Sedgewick, Eve. 1990. *Epistemology of the closet*. Los Angeles: University of California Press.

Simon, Bart. 2002. *Undead science: Science studies and the afterlife of cold fusion*. New Brunswick, NJ: Rutgers University Press.

Smithson, Michael. 1989. *Ignorance and uncertainty: Emerging paradigms*. New York: Springer.

———. 2008. Social theories of ignorance. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Chap. 9, pp. 209–29. Stanford, CA: Stanford University Press.

Tapp, Klaus P. 2000. Distinguishing non-knowledge. *The Canadian Journal of Sociology* 25 (2): 225–38.

Tuana, Nancy. 2008. Coming to understand: Orgasm and the epistemology of ignorance. In *Agnotology: The making and unmaking of ignorance*, edited by Robert N. Proctor and Londa Schiebinger, Chap. 5, pp. 108–48. Stanford, CA: Stanford University Press.

Vaughan, Diane. 1996. *The challenger launch decision: Risky technology, culture, and deviance at NASA*. Chicago, IL: The University of Chicago Press.

———. 1999. The dark side of organizations: Mistake, misconduct, and disaster. *Annual Review of Sociology* 25: 271–305.

Watts, Duncan. 2011. *Everything is obvious: Once you know the answer*. New York: Crown Business.

Welles, James F. 1986. *Understanding stupidity: An analysis of the premaladaptive beliefs and behavior of institutions and organizations*. Orient, NY: Mount Pleasant Press.

Wynne, Brian. 1995. Public understanding of science. In *The handbook of science and technology studies*, edited by Sheila Jasanoff, Gerald E. Markle, James C. Peterson, and Trevor Pinch, pp. 361–91. Thousand Oaks, CA: Sage.