*Social Epistemology Review and Reply Collective*, 2014
Vol. 3, No. 5, 73-81. http://wp.me/p1Bfg0-1r2

# *Constructing and Investigating Absences in Knowledge*

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## Abstract

Absences in knowledge can be thought of as constructed, just as knowledge and technologies are constructed. Because absences can be desirable or undesirable, the purpose of studying absence needs to be considered. Sometimes presences disguise a type of absence, as in the case of fraudulent research, so absences obscured by existing knowledge also need to be investigated. Studying absences is inherently political.

## Images of absence

When we think of presence and absence, what mental image comes to mind? Consider the differences between absence as a body covered by clothing and absence as a field before a building is constructed. A body has a fair degree of continuity: from one encounter to the next, the body is much the same, though perhaps dressed differently. We know that a body exists, and we can imagine what it would look like. Is this a useful metaphor for the particular absence of knowledge called undone science (Frickel 2014), namely research that citizen campaigners would like to be carried out but hasn't been?

Another analogy emerges from ways of thinking about technology and the built environment. A house can be built in one location or another, or instead the choice might be to build a cinema or a bomb shelter or a parking lot. Looking at a meadow, the absence of artefacts says little about what presence might involve. Construction might begin on a shopping centre or an array of wind turbines. This view of absence is consistent with many approaches in technology studies that assume that technology is socially constructed. (Cowan 1983; Pinch and Bijker 1984; MacKenzie and Wajcman 1999). Not only are technologies imbued with the values and agendas of their creators and users, but they are also constructed in a more obvious way: they only exist because people have designed and created them. That a technology does not exist may be due to impossibility, cost, low priority or marginalization. Applying this metaphor to knowledge suggests that absence of knowledge could be more like a meadow than a person's body. The absent knowledge is not necessarily waiting to be discovered, as scientists tend to think (Proctor 2008, 4), but to be actively constructed. Of course there can be standard blueprints and likely possibilities, but nonetheless the process may be less like uncovering a pre-existing unknown and more like sculpture: the creator's conception plays a large role in what is discovered.

## Desirable versus undesirable absence

Absences can be beneficial or harmful. Nuclear weapons can be constructed or decommissioned, and likewise knowledge of how to construct nuclear weapons can be

gained or lost (MacKenzie and Spinardi 1995). Peace activists would prefer that this knowledge be lost and never recreated in any form. Similar thinking applies to torture technology and biological weapons.

Whether absences are desirable relates to the purpose of research, in particular whether the abstract pursuit of knowledge can be separated from human practical goals. Nicholas Maxwell (1984; 1992) argues that what he calls the "philosophy of knowledge" (the pursuit of knowledge without concern about its applications) should be replaced by the "philosophy of wisdom" (the pursuit of knowledge that serves human betterment). The same distinction can be applied to the study of absence: by analogy with Maxwell's terms, it is possible to argue that the "philosophy of knowledge about absence" should be replaced by the "philosophy of wisdom about absence." An aspect of the latter might be not studying some areas of absence, or making them taboo.

The connection between the construction of technology and knowledge is more than an analogy, because of the interrelation between the two, captured by the term "technoscience." Much knowledge depends on technological means, so the technological trajectory of a society in part shapes its system of knowledge. This means that there is no independent body of knowledge waiting to be discovered, because the actualities of technology (and human bodies, themselves shaped by human-created technology) shape the configurations of associated knowledge systems, and preclude some possible knowledge. If, by the chance circumstances of personalities or natural events, human history goes down one path rather than another, then technology-knowledge systems can be significantly different.

With the technology metaphor, and with an orientation to the philosophy of wisdom, absence is not studied just because it is (not) there, but instead to achieve something, whether aesthetic or practical. For example, the technological landscape would be different if society were organized differently, for example with widespread industrial democracy, a nonviolent defense system or lacking intellectual property (Martin 1998). The associated knowledge landscape would also be different. The knowledge that results from undone research being carried out in present-day society could well be different from the knowledge that would result from research, on similar topics, in a differently organized society.

**Kidney Stones**

To illustrate this perspective, consider knowledge and absence concerning what we call kidney stones. These form in some people's kidneys and usually pass while urinating. However, some stones can cause excruciating pain and may not be able to be passed. For this reason, medical researchers have looked for ways to deal with them. The primary trajectory is with technological intervention, with ever more sophisticated apparatus. Surgery is a traditional route, and there are now several surgical options. Less invasive is the highly expensive lithotripter, using focused sound waves to cause the stones to

fragment and thus be passed more easily, a process called extracorporeal shockwave lithotripsy. Another option was discovered by researchers in the 1960s (Gershoff and Prien 1967; Prien and Gershoff 1974). For people with the usual US diet, the most common kidney stones are composed primarily of calcium oxalate. For those with these sorts of stones, taking supplements of magnesium and vitamin B6 can prevent the formation of kidney stones.

As is well known, medical research is primarily oriented to cure, not prevention, so it is not surprising that this nutritional intervention is not well known. Much medical research is also driven by the profit motive. Because magnesium and vitamin B6 are cheap and not patentable, companies have little incentive to investigate this option. If a patentable drug had been discovered to prevent kidney stones, no doubt it would be widely touted and known to every general practitioner — for the 5 or 10% of people who develop kidney stones, this would be a lifetime prescription.

Kidney-stone technoscience, by going down the road of high-tech cure rather than low-tech prevention, has generated associated areas of undone science. For example, it is possible to imagine using surveys of kidney-stone composition as a function of diet, metabolism and demographics to investigate nutritional prevention options designed for particularly vulnerable sections of the population. Implementing such prevention options would change the health of the population in other ways, leading to the availability of other sorts of knowledge and interventions. In such a parallel universe of technoscience oriented to prevention and a gift economy rather than cure in a profit-driven economy, the features of undone technoscience would be different, possibly dramatically so.

The point is that absent knowledge may not be waiting to be discovered, but instead may take different forms depending on the circumstances and processes involved in actively constructing it. The same sort of analysis could be undertaken concerning the technoscience of communication, transportation, energy and other areas.

**Bias and Absence**

Some knowledge that exists today will later be judged to be false. In some fields, critics allege that groups with vested interests have systematically distorted or corrupted the knowledge-production process. For example, the pharmaceutical industry conducts most studies of new drugs in-house. Studies without positive findings may be withheld, data manipulated, articles written by industry staff and authorship given to academic scientists, reports of adverse effects ignored or suppressed, and scientists who challenge the industry agenda discredited. The result of this process can be findings published in prestigious medical journals that are designed to aid a pre-planned marketing operation (Abraham 1995; Angell 2005; Goldacre 2012; Gøtzsche 2013; Kassirer 2005; Sismondo 2009). Such findings might be described as biased, due to the distorting influences involved in their creation.

This process is closely related to the manufacture of ignorance (Oreskes and Conway 2010; Proctor 1995; Proctor and Schiebinger 2008), as when corporations cast doubt on solidly backed findings, for example about climate change or smoking and cancer. The pharmaceutical industry's more dubious operations might be called the manufacture of falsehood: they are less about contesting well-attested findings and more about establishing claims considered credible — published in top medical journals —while hiding their shaky or fraudulent foundations.

The concept of bias implies the existence of unbiased, objective knowledge, and thus invokes a positivist approach to knowledge. Using a constructivist approach, it is more awkward to talk about these problems. It might be said that the conditions under which knowledge is constructed favor one set of ideas over another, though this is close to a tautology within constructivism, because all knowledge is constructed. Another possibility is to say that some knowledge is constructed under conditions that serve groups with vested interests, and that under other conditions different knowledge would probably be developed.

Whatever the language involved in describing knowledge that is systematically shaped by vested interests, this sort of knowledge needs to be addressed in discussions of undone science and absent knowledge. If some knowledge is seriously distorted, biased, selective or low quality, then where should it be situated in a picture of knowledge that is present or absent?

One problem in addressing this question is that all knowledge is shaped in various ways, including by the career interests of the researchers, prevailing social and scientific ideas, availability of funds, and potential applications. There is no pristine knowledge, independent of social influences. But this does not mean all knowledge is of equal quality: knowledge claims can be assessed using familiar scientific criteria such as consistency, reproducibility and openness to scrutiny.

The problem of quality control in the production of knowledge is important and long-standing (Ravetz 1971). Only in some places and times are the conditions suitable for producing high-quality knowledge.

In extreme cases, commonly called scientific fraud, researchers manufacture or manipulate findings in gross violation of prevailing norms; alternatively, they may perform their work in such a shoddy fashion that few experts in the field would give it credence. In some areas of research and parts of the world, fraud and shoddy research are commonplace. Does this mean that the results should not count as knowledge? The results are present but might be deemed misleading, perhaps even a false front hiding what might be uncovered by more rigorous investigation.

The possibility that knowledge can be systematically shaped by powerful groups points to the importance of seeing absences as constructed, just as presences are. Just as existing knowledge can be selective, shoddy and even fraudulent, so can absences.

Some knowledge can be called shoddy or biased. Conditions to produce high-quality knowledge oriented to human needs can serve a double function, both in constructing knowledge and in preventing infestations of low-quality knowledge that pre-empt or disguise the possibility of something better.

**Investigating Undone Science**

It can be valuable to classify features of ignorance, absent knowledge and undone science (Croissant 2014). Then there is the question of investigating it. Frickle (2014) says there have been few empirical studies, but this assessment depends on what counts as empirical studies. There are quite a few potential candidates. For example, Hess (1997) and Proctor (1995) have looked at the creation and maintenance of ignorance related to cancer. See also Frickel et al. (2010), Hess (2006) and Woodhouse et al. (2002).

Here I'd like to comment on one particular tool for investigating undone science: analyzing tactics used by powerful groups against theories they find unwelcome. The background is the phenomenon I have called "suppression of dissent" (Martin 1981; 1999). A typical example involves a researcher who speaks out against orthodoxy on a contentious issue — for example fluoridation, pesticides or vaccination — or who does research that threatens the orthodox position, and who suffers adverse actions. Assessing whether the adverse actions are correlated with or could be reprisals against dissent can be difficult. I've found (Martin 2013, 39–43) that some useful markers are (1) comparable peers of the researcher are not subject to the same adverse actions (the double standard test), (2) the adverse actions immediately follow the expression of dissent, (3) complaints about the research or the researcher are made to the researcher's superiors (and not directly to the researcher), (4) the adverse actions are by or on behalf of a powerful group, and (5) discussion of the contentious issues is avoided.

Adverse actions, which can be called reprisals, are important in several ways. They can stymie the research by the targeted dissident and discredit the dissident's work. Most importantly, they send a signal to other researchers about the risks of entering a field or taking certain positions. This so-called chilling effect helps explain why some areas of research remain undone.

Later I developed the backfire framework: when a powerful group does something that is potentially seen as unjust — for example torturing political opponents or massacring peaceful protesters — it often uses various methods to reduce public outrage. Five common sorts of methods are to (1) cover up the action, (2) devalue the target, (3) reinterpret what happened by lying, minimizing consequences, blaming others, and framing the events favorably, (4) use official channels such as formal investigations to

give an appearance of justice, and (5) intimidate or reward people involved (Martin 2007). These sorts of tactics are found in a wide range of areas, from sexual harassment to genocide, so it seems plausible to expect they might also be used in contentious scientific issues. If defenders of scientific orthodoxy are worried that their actions might be seen as unfair, for example by violating widely accepted norms, then one or more of the five methods might well be present.

I used this approach in looking at the scientific establishment's response to the theory that AIDS developed from contaminated polio vaccines used in Africa in the late 1950s. There is evidence of all five methods of reducing outrage in this case study (Martin 2010). When these methods are deployed, a possible consequence is undone science. Even a casual inspection of struggles over cancer therapies or smoking reveals the use of the same sorts of methods.

The implication is that analyzing the tactics used by players in the field a useful tool for studying undone science and manufactured ignorance, namely the sorts of areas where powerful groups have a stake in certain types of knowledge being absent, obscured or discredited. In this way, it is possible to sidestep some of the epistemological issues, because the key criterion is whether the game of science is being played fairly, according to the stated rules for good practice, including some of Merton's classic norms. When some players violate or trample the rules, for example by covering up evidence or suppressing dissent, this is a good indication that ignorance is being manufactured and science is being left undone. Those who investigate the tactics of suppression and outrage management are themselves likely to be seen as partisan and possibly come under attack, creating the possibility of undone research into undone science. The theoretical possibilities are fascinating and the methodological challenges formidable, but more important are the practical implications of undone science for people's lives. This brings the discussion back to the question of the purpose of studying absence: is knowledge of absence and of struggles over absence a goal on its own, or is it part of a wider effort towards creating a better world?

**Acknowledgments**

I thank David Hess, Nicola Marks and Robert Proctor for valuable comments on drafts.

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