

**BULLSHIT WITH SCIENTIFIC PRETENSIONS: ASSUMPTION DRIVEN
SIMULATED CLAIMS IN HEALTH TECHNOLOGY ASSESSMENT**

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ABSTRACT

The long-standing commitment in health technology assessment (HTA) to the construction of assumption driven models to create non-evaluable claims for cost-effectiveness raises an intriguing question: is this belief system science, pseudoscience or bullshit. With no-falsifiable claims the presumption must be that the models fail the standards for demarcation between science and non-science. This leaves a revised question: are these models a variety of pseudoscience or just plain bullshit. This is an important distinction. Science is typically viewed, in its normative sense, as a systematic and critical investigation to acquire the best possible understanding of the workings of nature, people and society. Put simply, and this applies to the social sciences as well, a science provides the framework for determining which beliefs are epistemically warranted through fact finding practices. This leads to the criteria for demarcation: falsification, which, in Popper's view, is the necessary and sufficient condition for distinguishing science from non-science or pseudoscience. Accepting Popper's criteria would relegate assumption driven simulations to a niche category in pseudoscience; but is this sufficient? Is there the possibility that we overlook the category of bullshit? The ability to distinguish HTA as pseudoscience rather than bullshit or vice versa raises a number of questions. These follow from the OED definition of pseudoscience as a pretended or spurious science involving a collection of beliefs that are mistakenly regarded as being based on scientific method with the status that scientific truths have. Care has to be taken in considering how pseudoscience differs from nonscience, bad science and science fraud, although to lie has an important contribution to the concept of pseudoscience where there is deliberate deception in the propagation of falsehoods. Bullshit, once we consider deception as a key element in pseudoscience, stands apart with a complete lack of concern with the truth. While it is possible for a lie to be exposed, bullshit resists such exposure because it makes no definite claims; it lacks epistemic conscientiousness. The purpose of this brief note is to consider the relationship between pseudoscience and bullshit and to provide a provisional solution in the case of HTA models as a threat to belief: the belief is bullshit with scientific pretensions. Finally, while use of the term 'bullshit' might disturb the more genteel and sensitive reader, it is a term that is accepted currency in the philosophy of science.

INTRODUCTION

It has been noted on a number of occasions that health technology assessment (HTA) presents a puzzle: the longstanding belief in the construction of assumption driven modeled simulations that create 'evidence based' claims that are both non-evaluable but also imaginary¹. The evidence for the model is the assumptions establishing the model's structure (typically Markov) and the data

inputs selected from clinical trials and the wider HTA literature. There is no conception of the standards of normal science for credible hypotheses, empirical evaluation and replication (and reproduction) or for the standards of fundamental measurement. In the latter case, following the Rasch model, all claims must be for single attributes, linear, interval and invariant where, in the case of patient reported outcomes in HTA, the Rasch model is unique in transforming counts and observations to interval measures ². This is ignored in HTA as are wider considerations of the necessity of the standards for falsification and normal science.

Instead, there is a meme (not a paradigm) that is probably best viewed as, by default, a framework of analysis that is epistemically relativistic; or anything goes, where normal science has no special claim to knowledge and the acceptance of a particular set of belief is essentially sociological ³. In other words, there is no special claim for the search for intersubjective knowledge or observer independent reality; there is no meaningful distinction between science, pseudoscience and bullshit ^{4 5}.

The purpose of this commentary is to assess the epistemological status of assumption driven simulations to create approximate information that are the core framework for the HTA belief system ⁶. The question of interest is whether we view the endorsement of assumption driven modelled claims as just a type of pseudoscience or whether there are more fundamental issues, not just the open door to deception and fraud, but of the entire corpus of belief as bullshit with scientific pretensions; epitomizing a conscious commitment to the absence of epistemic virtue ⁷.

DEMARICATION

While postmodernism in its various guises, including epistemic relativism, has long failed to be taken seriously in its failure to recognize the core of what makes science meaningful, the necessary and sufficient condition of falsification, there is still debate over what may be considered the ‘fuzzy’ demarcation frontier ⁸. Popper thought that in invoking falsification he had also solved Hume’s problem of induction and the circularity of claims for confirmation ⁹. Unfortunately, Popper (to many) oversimplified: do scientists actually behave as falsificationists? If scientists are reluctant to be true falsificationists, dispensing with a theory as soon as a claim is falsified, then we fall back on the question of when is a theory rejected or, more often, modified. To what extent does the belief held by a scientist or team, one that they want to confirm rather than falsify, lead to efforts to reverse the negative results?

Add to this the question of the reluctance by many to reject a theory, is the question of the techniques applied to support a claim for falsification or non-falsification. There are a range of techniques, many specific to disciplines, that need to be evaluated to separate opinion from knowledge. Plus, of course, the inevitable attraction of fraud ¹⁰. The willingness of a small number of scientists to engage in outright fraud is well established, including the invention of patient data and the modification of images. But fraud can take more subtle forms; including the choice of assessment measure, the trimming of data to eliminate outliers and the suppression of results in a well-crafted peer-reviewed paper. The ‘science fictions’ as Ritchie describes them can include the employment of hand-picked consultants to craft models and the contracting with paper mills, as well as successful and less successful fraud on unsuspecting colleagues and journal editors.

In the case of HTA, all of the above apply as there seems no obvious effort to address the issue of epistemic knowledge. The problem is, however, much wider: HTA is not committed to falsification because it has justified and scrupulously followed for over 30 years the creation of imaginary claims which are designed to avoid any possibility of being falsified. This denial is best exemplified in the standard textbook which gives a detailed framework for creating imaginary claims ¹¹ .

It is important for our assessment of the HTA belief in imaginary modelled claims to recognize that Popper continued to maintain that falsifiability is both the necessary and a sufficient criterion for demarcation; a sentence or a theory is empirical-scientific if and only if it is falsifiable. For practical purposes this is the core of demarcation whether you take a rigid single assessment standard or a more sophisticated accumulation of evidence framework. This is important because we are dealing in HTA with deliberately designed non-falsifiable claims which must fail the possibility of demarcation; the claims are non-falsifiable.

DEFINING PSEUDOSCIENCE

The Oxford English Dictionary (OED) defines pseudoscience as: *A pretended or spurious science; a collection of related beliefs about the world mistakenly regarded as being based on scientific method or as having the status that scientific truths now have.* The emphasis by a number of writers, as noted by Hansson, is that pseudoscience is non-science posing as science; accepted beliefs masquerade as genuinely scientific ones ¹². In other words, pseudoscience is seen to involve a sustained effort to promote standpoints different from those that have scientific legitimacy; it deviates from the quality criteria of science: reliability, fruitfulness and practical usefulness.

When the standards of normal science are summarized, it is to consider credible claims, empirical evaluation and replication (and reproduction). The first question is, therefore, the status of a credible claim: what distinguishes a credible claim from bullshit or pseudoscience? Hansson proposes two criteria to classify a claim as pseudoscience, where the second criteria can take a narrow (ii) or wider form (iii):

- (i) *It is at variance with the most reliable knowledge about its subject matter that is currently available; and*
- (ii) *it is part of a non-scientific doctrine whose major proponents try to create the impression that it is scientific or*
- (iii) *it is part of a doctrine whose major proponents try to create the impression that it represents the most reliable knowledge on its subject matter.*

Criteria (i) is a revised version of an earlier criteria which simply stated that the activity is not scientific. The revised version follows from consideration that demarcation recognizes the quality of science; the function of science as a process of discovery or fact-finding that has the objective of providing the most reliable current information. The process of discovery follows rules; pseudoscience while often attempting to mimic science, fails at his basic level. This does not, it

should be emphasized, imply, following Popper a rigid application of the test for falsifiability. We could opt for a more sophisticated falsification as detailed by Lakatos or adopt a multi-criterion as opposed to a mono-criterion approach, a check list, to label a theory or analytical framework as pseudoscience practice. Elements of such a list could include a belief in the authority of leaders in a field (particularly apt for HTA), non-testable claims, the process by which claims are created, nonreplicable or nonreproducible claims and the rejection of refutation. A major problem with the multi-criterion approach is which criteria do we choose, in particular in the assessment of clinical claims where it is suggested that the majority of such claims are false.

In terms of criteria (ii) and (iii) above, the question is the extent we wish to cast a narrow or wider net for a definition of activities that we characterize as pseudoscience. The narrower net is to consider activities characteristic of individuated sciences or belief systems that are seen as specific branches of knowledge. The wider net (iii) sees science as activities which share a common focus with the individual sciences as merely examples.

As Hansson makes clear, there is a critical distinction between science and pseudoscience¹². In the case of science there is agreement on the essential unity of the objectives of scientific enquiry and the process of creating and evaluating credible or falsifiable claims; ultimately, the determination of beliefs that are epistemologically warranted. Pseudoscience lacks any unifying theme or agreement: there is a smorgasbord of specific pseudoscience activities ranging from the HTA niche to intelligent design. Focusing on the HTA belief in assumption driven simulations the questions first and foremost is why was the reference instructions to populate Markov models developed. It is made quite clear that the focus was on approximate information⁶. To plug an evidence gap at product launch to give an evidence base that decision makers could be convinced to act upon. The decision was made to reject normal science, to reject hypothesis testing and the possibility test and to come down on the nonscience side of demarcation. In respect of criteria (i) above HTA belief system summarily rejected the possibility of developing through a planned research strategy to create reliable knowledge consistent with the standards of normal science. Instead of a commitment to reliable knowledge, mind-independent objective knowledge of provisional facts to support therapy decisions, the intent was to construct claims based on mind-dependent approximate information, assumptions from the literature and limited data from pivotal clinical trials, not to test hypothesis testing but to subvert it.

In respect of criteria (ii) this non-scientific doctrine of approximate information was promoted with the intention of creating a scientific aura. In respect of criteria (iii) this approximate information was given guidelines for assembly in order to represent it as the most reliable knowledge that could populate a Markov model or similar decision framework⁴.

In this commitment to nonscience, the HTA leadership succeeded beyond their wildest dreams with the acceptance of modelled imaginary claims as the necessary first step in formulary pricing and placement; a first and, unfortunately, last step as there was no path forward from the modelled claim. Certainly, gatekeepers could engage academic groups to act as reliable knowledge police to give a model or a revised version their good housekeeping seal of approval without recognizing the lack of the appropriate epistemic standards that are recognized outside of HTA in the sciences and other social sciences. The result is literally tens of thousands of published Markov models that

take advantage of this easy route via assumption based approximate information to support value claims.

In the present context belief in the relevance as decision criteria of assumption driven non-evaluable simulations raises the question of whether these beliefs are epistemologically warranted. This leads to the distinction raised earlier between the category of pseudoscience where there is no intention to deceive and pseudoscience with lies which, with the intention to deceive, is simply fraud. It is this second category which is of particular interest in categorizing the HTA belief and practice in creating assumption driven simulated imaginary claims. Even so, it is worth emphasizing Ladyman's contention that not all pseudoscience is necessarily science fraud¹³. While most of us at one time or another are lacking in epistemic conscientiousness one argument is that for a statement to be considered as bullshit as opposed to pseudoscience some minimal degree of unconscientiousness is required¹⁴. This seems weak; after all the essence of bullshit is the culpable indifference to truth; which applies to both the activity and the results in HTA simulation modeling.

While not perceived by an analyst as an indifference to truth, the belief that the particular choice of assumptions to populate a Markov simulation has truth-value is wrong. Putting intent and deception in assumption choice to one side, any set of assumptions can be claimed to have truth value for a simulation as long as there is a willingness to ignore put the problem of induction: a lack of understanding that the fact that past futures have resembled past pasts does not mean that future futures will resemble future pasts. The willingness to rest a case for imaginary and non-evaluable claims in HTA for cost-effectiveness on literally dozens of assumptions makes clear that the belief is pseudoscientific; a belief that relies on the denial of the problem of induction. Of course, assumptions have a role in theory construction and claims, but only if those claims are falsifiable in a meaningful time frame to meet the demands of decision makers.

The choice of assumption, deliberate or not, extends to measurement. Just as the problem of induction is sidelined so are the axioms of fundamental measurement. The willingness to challenge measurement standards and claim that ordinal scores are ratio measures in disguise, together with the denial that measurement must refer, not to composite algorithmic scores but single attributes with linear, interval and invariant properties are not acceptable. More than the denial of truth-seeking as justification for assumptions, what should be seen as a culpable indifference to measurement, notably Rasch modeling for interval measures, points to a deliberate rejection of standards in place for over 60 years¹⁵.

Of particular note is the obsession with the QALY in the HTA belief system. This has iconic status as the gold standard for applying imaginary non-falsifiable claims to decisions for resource allocation in health systems; the ubiquitous cost-per-incremental QALY calculus. Unfortunately, once fundamental measurement standards are applied the truth is that the QALY, with the assumption that the preference measure is interval and not ordinal, is a mathematically impossible construct. Once one lie is built on another the approximate information meme implodes¹⁶.

FRAUD AND PSEUDOSCIENCE

There is a question of whether fraud should be characterized as pseudoscience given that fraudsters claim to commit to the standards of normal science for evidence creation and falsifiable claims. One argument is that academic fraudsters, operating within the science belief system, whether merely tweaking their data, inventing patient data or relying on a paper mill are still endeavoring to give the impression to colleagues and journal editors that they are scrupulously following the accepted standards of analysis. As such, while lies and consequent fraud may be present, they might not be considered as outside the pale of science; they are not obviously pursuing pseudoscience.

An alternative view goes to intent to deceive. Certainly, there is a smokescreen of compliance with standards, but the object in HTA fraud is to produce a false or manufactured empirical claim that is supported at the required decision level. Fraudulent endeavors may persist for years, garnering accolades for the aspiring academic. A major problem is that fraudulent papers may be accepted, they may even be recognized as a seminal contribution, yet the final decision to retract a paper may be years in the making with those accused making every effort to obfuscate, often aided and abetted by colleagues and institutions. Yet these endeavors show no concern for the truth; as long as the false analysis passes muster with peer reviewers, journal editors and colleagues who are asked to be joint authors. Intent to deceive is a judgement call; all too often the perpetrators escape judgement.

Fraud is typically at the individual or small team level; it is opportunistic and intentional. It operates within a framework which is scientific where the variety of assessment procedures for reporting a satisfactory p-value, allied with the reluctance of journals to undertake a detailed assessment of the process of data collection and analysis, makes fraud an attractive option. In other words, the fraudster is trying to insert a particular falsehood into an accepted system of beliefs. The intent is fraudulent, even if the financial rewards are limited, with the author(s) hiding under cover of an accepted set of standards, a doctrine, which can hardly be described as non-scientific (see [ii] above). At the same time, the false knowledge gained by fraud is typically viewed as consistent with the subject matter knowledge for a particular field of study; it is reverse engineered to be seen as consistent with progress and the discovery of new facts. A fraud can be committed to meet the standard for falsification and demarcation where the entire exercise has been created from a set of patient data that has been designed to produce the required results. Unless it is possible to make a definitive case that evidence has been fabricated, then the fraudulent paper remains, at least until exposed, within the scope of science.

Where intent to deceive is present there is no excuse to give the fraudster an easy ride. From this perspective, fraud by academics is simply part of everyday experience with pseudoscience and should be seen as an integral part of the approximate information meme in the promotion of lies and attempts to relegate disconcerting facts to oblivion.

DEFINING BULLSHIT

The term bullshit entered the lexicon of the philosophy of science in 1986 with Frankfurt's seminal paper *On Bullshit*, with wider currency in its publication, as a book, of *On Bullshit* in 2005 and *On Truth* in 2007^{17 18}. The essence of bullshit is culpable unconcern with the truth or indifference towards the truth; the bullshitter is not concerned with truth or falsity; while capable of responding to reasons and argument, they fail to do so. They are epistemically unconscientious, but in two respects. In a narrow sense one may be indifferent towards the truth of a statement while in a wider sense one may care without taking care. While Frankfurt by and large endorses the narrow concept a more flexible or wider view is that those promoting bullshit exhibit a culpable lack of epistemic conscientiousness in adhering to a belief system that manifests a self-willed ineptitude, regardless of whether this manifests as indifference toward the truth.

This lack of concern with the truth of statements is, for Frankfurt, the essence of bullshit; bullshit is not false but phony. This sets bullshit apart from lying which is only possible if one knows the truth. The liar is someone who deliberately promulgates a falsehood. As such, the deception that characterizes lying is preferred to the deception that characterizes bullshit where the former intent is to divert attention from what Frankfurt describes as a correct apprehension of reality. Lying is considered by Frankfurt as more insidious than bullshit because of the intent: bullshit is indifferent to any notion of truth or falsity, there is no interest in describing reality correctly as elements of the bullshitter's case are just selected to suit the bullshitter's purpose. Liars are aware they are making false statements, including false assumptions. Bullshitters are not interested.

THE APPROXIMATE INFORMATION MASQUERADE

For Frankfurt, lying is the greater enemy than bullshit. With sufficient scrutiny lies can be disproved, the claim for an ordinal score assumed to act as a ratio score is easily demolished. But bullshit, which makes no claims at all cannot be demolished; it is unconcerned with the truth or, in our terms, falsification. It takes, without justification, the ratio score as appropriate. The distinction between lies and bullshit lies in the intent and motivation behind a communication. If the communication is dependent on lies for it to be accepted by a recipient such as a formulary committee or health system in therapy assessment, then the acceptance depends upon maintaining a masquerade of revealed truth. Those promoting and ensuring the transmission fidelity of the belief system, the relativist position that truth is consensus, maintained by rhetoric, persuasion and authority ensure that there is no appeal to superior evidence, the normal science standard. Whether the masquerade is promoted as lies or just a minor misrepresentation to ensure the model creates reliable approximate information, lies become fraud where the creation of evidence is no different from contracting with a paper mill where the parties are unconcerned with what they are saying is true or false. The factual accuracy of claims takes second place to the need to be seen as knowledgeable, impressing the recipient. Suppressing criticism of lies ensures that what is produced is nothing more than bullshit; they share a common disregard for the truth. Where lies are widely promulgated, as in the case of measurement, with no apparent willingness to disprove them, then there is no coherent epistemic framework that can be justified. Lies may be the greater enemy, but bullshit is embraced when lies are never challenged. In this important sense, the roles are reversed.

The intent of both pseudoscience and bullshit is to convince an audience that a factual claim is actually being made although there is no basis for falsification; it must be taken at face value. There is no notion of collective endorsement to support claims for empirical adequacy. Both bullshit and pseudoscientific claims are one-off. This does not mean that the approximate information modelling is necessarily pseudoscience; the bullshit framework could equally well embrace it. Stepping back, faced with an HTA Markov model. would we characterize that model as pseudoscience with lies or as bullshit, a falsehood that does not descend to lying?

A key point to note is that in the reference guidelines and in the promotion of the HTA belief system there are no qualifications presented that might cast doubt on the embrace of approximate information. The role of assumptions is taken at face value; the role of simulations is taken at face value. The belief system explicitly maintains that this is the necessary and sufficient framework for supporting formulary decisions with the QALY as the center piece. Yet omissions of substance are no different from lying. To admit to lying regarding, for example, the failure to apply the recognized standards of fundamental measurement is put aside because it would destroy the entire analytical framework. Inconvenient critiques are ignored and, where possible never published. The leading textbook for the application of HTA makes no mention of the unique status of Rasch measurement in creating PRO value claims; where measurement is briefly mentioned, the discussion is a best confused and uninformative ¹¹. Lying, otherwise deception, is fundamental to the success of modeled HTA claims

It is this reliance on omissions, on lying, that sets the claimed pseudoscience of the HTA meme apart from bullshit where there is no intention to lie or deceive. Certainly, there are falsehoods, but no intention to amount to lying. This does not mean that bullshit is not carefully wrought; messages that are tailored with advertising are prime examples. This means that there is no reason why a carefully constructed bullshit presentation cannot be considered as sufficient to inform formulary decisions. After all, few recipients of such models bother to probe very far below the surface.

This leads to an interesting symmetry: is approximate information created with lying only the reverse side of a coin of approximate information without lying? Or are we looking at a situation where there is misrepresentational intent in the pseudoscience approach to approximate information. A deliberate intent to drive us away from a correct apprehension of reality because, unknown to the recipient, we are asked to believe something that their belief system considers false. Rejecting hypothesis testing in favor of approximate information and the implications that follow from this would appear to fit this interpretation of intent. It is not as though the leadership in HTA is unaware of the standards of normal science and, hopefully, fundamental measurement; it is that they want to put this to one side in pursuit of non-falsifiable cost-effectiveness claims. The intent is to lie.

Which brings us to the position taken by Frankfurt that a lie is the greater enemy of the truth than bullshit because a lie can always be challenged. In HTA, to challenge the lies destroys the belief in approximate information modelling; to meet a challenge consistent with the required standards requires a new paradigm. Few seem prepared to do this. Pseudoscience in HTA gives the aura of reasonableness for a non-scientific doctrine. For followers of a meme where the believer unconsciously and automatically rejects substantive criticism, the truth-value of statements is of

no interest. A situation that Dawkins describes as the presence of a mind virus where the HTA advocate and practitioners *who are impelled by a deep inner conviction* that the approximate information simulated Markov framework *is true, or right or virtuous but which owes nothing to evidence or reason* ¹⁹. Populating a Markov framework with a smorgasbord of assumptions culled from the literature is not evidence which, in any case, fails to recognize the problem of induction.

The absence of any substantive challenge to the approximate information assumption driven belief system and the sheer longevity of these beliefs points to the conclusion that what in pseudoscience we describe as lies or fraud does not arise. There is no question of the falsity, judged by fundamental evidence standards, of the algorithms creating for multiattribute instruments such as the EQ-5D-3L/5L preference scores. These are accepted as given; the fact that they are ordinal and not interval scores, let alone being composite creations is immaterial. Following from this, the QALY is accepted as the appropriate measure for therapy response with no thought given to the mistaken belief that ordinal preferences can support multiplication, together with a complete lack of concern in the application of non-falsifiable claims as the basis for resource allocation in health systems. It is as though the embrace of the mind virus had transformed pseudoscience with lies to bullshit with no concern for the truth. Lies may be more destructive, but only if they are seen as something other than a mystery that should never be challenged because they are, in effect, so impossible as to be believable.

Accepting non-challengeable mysteries leads to an alternative characterization: pseudoscience is bullshit with scientific pretensions, and is just as indifferent to the truth as bullshit without scientific pretensions. The possibility of a mind independent external reality is irrelevant as is any thought of discovery and epistemic conscientiousness. Claims are made to suit present purposes; the approximate information modelling is product marketing with the carefully crafted model supporting the sponsors product. This indifference to truth in model construction and claims is of no concern. The model provides the aura of scientific pretension with an always justified choice of assumptions and incremental cost-per-QALY claims defended as the master stroke for reliable cost-effectiveness claims, supported by copious tables and sensitivity analyses, notably probabilistic sensitivity analysis which relies on the mathematically impossible QALY.

Taken overall, the assumption driven model simulations are culpable bullshit; a complete indifference or lack of concern towards what we can call the truth. Indifference as bullshit should be distinguished from lies and fraud in the advocacy of assumption driven simulations although they are all captured under the umbrella of bullshit. The analyst might be aware of the importance of transforming ordinal to interval score to create a well calibrated measure but continues to use ordinal scores because it is too demanding to transform to an interval score. The truth is put to one side with a claim that when looked at through HTA spectacles ordinal scales are interval measures in disguise. Without, it might be noted any justification for this position. If this is the case, then it should be considered deliberate deception. As these claims have been designed to influence decision makers; particularly the more ill-informed or those without the requisite training then pseudoscience with lies and the open door to deception becomes the bullshit standard for formulary decisions. Where lies are widely promulgated, as in the case of measurement, with no apparent willingness to challenge them, then there is no coherent epistemic framework that this can justify.

Lies for Frankfurt may be the greater enemy; but bullshit is embraced where lies are never challenged or acknowledged.

CONCLUSIONS

The rejection by the leadership and membership in HTA of the standards of normal science and fundamental measurement leads us to categorize assumption driven simulations as bullshit. It is not just a question of lies and other false statements which characterize simulation modeling, the presence of fraud in the creation of evidence, but the lack, intentional or otherwise, of an epistemic consciousness. The creation of knowledge, the process and progress of the discovery of new yet provisional facts, the understanding that there is a mind independent reality not a mind dependent reality, point to the danger of embracing the HTA belief system.

Instead, we have the paradoxical situation, where rather than lies being the greater enemy of truth, the HTA belief system is more appropriately characterized as bullshit, where the indifference to truth in bullshit is the greater enemy of truth. Lies are irrelevant to believers in the HTA meme; if lies are accepted (but not as seen as lies as such except to an independent observer) then bullshit takes the high ground. This leaves us with the approximate information modelling simulation belief system as, at best, characterized as bullshit with scientific pretensions. The point is well put by Ladyman: the way bullshit and pseudoscience disconnect us from the truth is more insidious than lying for we may end up with not just false beliefs but no beliefs at all ¹³. We lose contact with reality.

Both bullshit and pseudoscience produce epistemic noise with only a superficial resemblance to the truth; assertions are made that this epistemic noise is a scientific issue with modes of presentation to dress it up in a more 'serious' aura. Perhaps we might drop the term pseudoscience as implying false claims, such as cost-per-QALY thresholds, and treat the HTA belief system supporting modelled claims as pure and simple bullshit where claims are divorced from reality; unconnected from the truth. It is not, therefore, a question of what side of the demarcation divide you all on, but the fact that the notion of demarcation has no relevance whatsoever to modelling bullshit; continuing the relativist tradition. The HTA belief system in encouraging a program of non-factual and non-evaluable claims for an unforeseeable future that is focused on the endless production and publication of bullshit, is hardly a future to look forward to in health care decision making.

As a final point it is important to consider again the quality of science, in particular the notion of fruitfulness where an assessment is made between studies to assess whether one is scientifically more valuable. Fruitfulness is impossible within the HTA meme or belief system with the fulsome embrace of bullshit with an aura of scientific pretensions. There is no concept of progress, the discovery of new yet provisional facts and new perspectives on existing assessments. The HTA belief in assumption driven simulation is a dead end; it is barren. Each exercise is a one-off publication that has no pretention to discovery and progress. This should come as no surprise; bullshit is hardly a basis for the evaluation of the truth-value of claims as it is completely indifferent to the question. Those subscribing to the HTA meme or belief system show no motivation to arrive

at the truth; no authentic motivation for knowledge. Rather, they have chosen the rabbit hole of bullshit.

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