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Antirationalist critique or fifth column of scientism? Challenges from *Doctor Who* to the mad scientist trope

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Much of the public understanding of science literature dealing with fictional scientists claims that scientist villains by their nature embody an antiscience critique. I characterize this claim and its founding assumptions as the "mad scientist" trope. I show how scientist villain characters from the science fiction television series *Doctor Who* undermine the trope via the program's use of rhetorical strategies similar to Gilbert and Mulkay's empiricist and contingent repertoires, which define and patrol the boundaries between "science" and "non-science". I discuss three such strategies, including the literal framing of scientist villains as "mad." All three strategies exclude the characters from science, relieve science of responsibility for their villainy, and overtly or covertly contribute to the delivery of pro-science messages consistent with rationalist scientism. I focus on scientist villains from the most popular era of *Doctor Who*, the mid 1970s, when the show embraced the gothic horror genre.

Key words: *Doctor Who*, mad scientists, trope, gothic horror, rhetoric, contingent repertoires, madness

1. Introduction: the "mad scientist" trope

Half a century ago, two landmark texts were born: Walter Hirsch's (1958) sociological study of the image of fictional scientists, and the science fiction

television series *Doctor Who* (BBC, 1963). Both have spawned hideous (and not so hideous) progeny. *Doctor Who* recently became the longest running science fiction television series in the world (BBC News, 2006b) on the back of its new series (BBC, 2005). And scholarly work investigating and debating the cultural function of fictional scientists, particularly scientist villains, and their significance for public attitudes to science, continues today.

Yet the meanings for science of *Doctor Who*'s many scientist characters have not been examined in scholarship in any depth. This paper seeks to redress that oversight by examining some of *Doctor Who*'s scientist villains, and showing that they have much to offer this conversation.

Scholars in the public understanding of science field commonly claim that fictional representations of scientist villains largely represent a critique of science related to societal discomfort or negativity towards science (Frayling, 2005; Haste, 1997; Haynes, 2003; Haynes, 1994; Millhauser, 1973; Toumey, 1996; Weingart, 2006; Weingart et al., 2003; Weingart and Pansegrau, 2003; and references therein). Such views are not confined to the academy and commonly appear in reference to "mad scientists" in popular works on fiction (e.g. Searles, 1988) or science (e.g. Jeffrey, 1997; Marshall, 2008). The recurrence of negative imagery and stereotypes in public debates over science controversies, for example caricatures of Frankenstein's monster used in discussions of biotechnology, has contributed to this view (Haynes, 2003; Turney, 1998), as has the fact that fictional scientist villains are generally more well known than real scientists (Haynes, 1994). Kirby (2003) cites numerous scientist voices, including the US National Science Foundation, who object to fictional representations of scientists on the grounds that they are predominantly negative and damaging to science.

These authors differ in their assessment of whether such "damage" to science is warranted, and whether it is desirable. Weingart (2006), for example, acknowledges science's potential for creating danger and destruction, but is highly concerned about negative characterizations of scientists in fiction because of their potential for inflaming antirationalist ideologies including creationism. Haste (1997), on the other hand, is more moderate in characterizing mad scientists as modern manifestations of "our" cultural heritage, implying they are a legitimate expression of public sentiment.

But regardless of these different motivations and ideological orientations, two problematic assumptions underlie the literature as it currently stands. First, many of these authors make deficit model assumptions about the public reception of scientist villain characters, assuming audiences will always respond to scientist villains in the same way, and usually --- for better or worse --- with an antiscience critique. This has been challenged to some extent in this field. In discussing representations of science in superhero comics, Locke (2005) argues against deficit model approaches, stating that publics neither monolithically accept nor monolithically reject science, but negotiate diverse and complex relationships to it within social, political and cultural contexts. This view is consistent with the work of Jones (2001), who found that contemporary critics' responses to representations of scientists in post-war British films did not necessarily match the reading of the films as interpreted by later scholars, suggesting audience reception can vary widely. Communication theorists (Hall, 1980; Suleiman, 1976) and sociologists of science (e.g. Wynne, 1992) in general have long emphasized the primacy of social context for drawing meaning from communication. Empirical studies of audience responses to the political orientation of *Doctor Who* have also found that viewers interpret the program's meanings and respond to it in diverse ways not expected by scholars and not

consistent with scholarly interpretations (Butler, 2007; McKee, 2004; Tulloch and Jenkins, 1995). These works present a strong challenge to assumptions about fiction's unitary influence on public attitudes to science, although the relative dearth of empirical work in the field remains a shortcoming.

But it is the second problematic assumption that this paper seeks to address: the assumption that scientist villains or "mad scientists" always constitute an authorial critique of science. Locke (2005) is an exception who considers scientist characters in superhero comics to be indicative of ambivalent authorial attitudes towards science, not a unitary critique. Haynes' (1994) work, too, shows that changing social attitudes to science have produced diverse representations of scientists in fiction, including a range of "goodie" scientists. Similarly, in his study of horror films, Tudor (1989) notes variation in the extent to which blame for science-related threats is attributed either to scientist villains or alternatively to "natural" externalities such as radioactivity. He links such variation to historical trends in public attitudes towards science, for example showing that during the 1950s and early 60s, at a time of pro-science sentiment in the West, scientist characters were largely, but not entirely, relieved of responsibility for the creation of science-based threats.

But these considerations have not mitigated the views of some scholars. For example, Weingart warns that "the mad scientist of the movies" is the "natural opponent" of science policy makers and proponents of science (Weingart, 2006: sect 1). In mounting this argument he draws on Toumey (1996), who is unequivocal in identifying mad scientists in gothic horror fiction as a Romantic antirationalist critique. Haynes, too, has emphasized the image of the scientist as "an evil and dangerous maniac, obsessive, secretive, ruthless, and arrogant" over and above the

more ambivalent or positive images she has documented, by naming it “the master narrative of scientific knowledge in both literature and film” (Haynes, 2006: 5).

Based on this body of scholarly and popular work, the stereotype of the “mad scientist,” together with the assumption that it essentially constitutes a critique of science, has become a trope, meaning an epistemic construct which functions as shorthand for an entire package of cultural ideas. Not only is the “mad scientist” an actual cultural stereotype, but it is widely understood to be a stereotype, and so as a label is frequently applied to scientist villains with little deeper analysis of the diversity of their manifestations, as any internet search will attest. Even in scholarship the phrase is used rather arbitrarily, for example, while Haynes’ (2003) definition of the “mad, bad, dangerous scientist” stereotype specifies megalomaniacal ambitions, Flores (2002: 646) defines the medical mad scientist as “the physician who values research much more than the patient” (more consistent with Haynes’ “inhuman researcher” stereotype, as are Kawana’s (2005) “mad scientists”), and Tudor (1989) uses the term as a catch-all for scientist villains. If the mad scientist has become so culturally familiar as a trope that we no longer see what is there nor cognitively process its meaning, then we must approach its examination with fresh eyes.

In this paper I use examples from *Doctor Who* to achieve this end. Scientist villains in *Doctor Who*, like Locke’s (2005) comic superheroes, often represent authorial ambivalence towards science, but the *Doctor Who* material allows the argument to be pushed beyond this. There are some scientist villains in *Doctor Who* who narratively function as vehicles for pro-rationalist, scientistic ideology. *Doctor Who*’s representation of scientist villains is different enough from what has become familiar within the mad scientist trope to warrant new examination. Its unique framing

of the issues may show us discursive complexity we did not expect to find (Kracauer, 1961).

This analysis therefore aims to challenge the mad scientist trope with a view to defusing its rhetorical power. This does not mean discounting the importance or prevalence of the scientist villains who *do* constitute an antirationalist critique. Nor do I mean to imply that there is no antirationalist critique to be found in *Doctor Who*; there is, and it is significant. But identifying it is not necessarily a straightforward task. Elements of characterization and setting that scholars have identified as common to works they consider to be antirationalist, such as scientists working alone, at home, and in secret (e.g. Haynes, 1994; Weingart, 2006) --- in other words, elements that have become a part of the mad scientist trope --- do not, for example, in and of themselves, indicate an antirationalist orientation where they appear in *Doctor Who*. Other aspects of production suggest very different interpretations. It is the task of this paper to bring these to the fore, to challenge the simplistic view implied by the trope, and to contribute to a more nuanced understanding of the ideological significance of scientist villains.

2. Science and *Doctor Who*

The original series of *Doctor Who* ran for 26 seasons from 1963-89. It was revived as a continuing series in 2005. *Doctor Who* began as a semi-educational program designed to foster children's interest in science and history (Marcus, 2007; Tulloch and Alvarado, 1983). Its creators have sometimes strived to include realistic science, even hiring medical scientist Dr Kit Pedler from the University of London to be the program's scientific advisor in the 1960s (BBC, 2009; Salusbury, 2006). *Doctor Who* is often seen as a "sciency" show, with some scientists claiming to have chosen

science careers because of *Doctor Who* ("Sci-Fi Science: The True Science Behind Science Fiction", n.d.), recent books being published about the science of *Doctor Who* (Parsons, 2006; White, 2006), and former UK science minister Malcolm Wicks encouraging teachers to use *Doctor Who* in the science classroom (Gray, 2007), a suggestion which has been taken up in some quarters (Haile, 2008; Turner, 2008).

The central character of the program is known only as “the Doctor.” The Doctor is a Time Lord from the scientifically “advanced” planet Gallifrey, and travels through time and space. Between 1963 and 2009 he was played by ten actors. The Doctor has superior, almost omniscient technical skills and vast scientific knowledge. For the series’ first two decades, the Doctor strongly identified as a scientist and as a champion of science (see Jones, 1997). This declined during the 1980s, and in the new series he has never claimed to be a scientist, though his scientific and technological skills remain central to his characterization, and on occasion other characters have labelled him “scientist.”

Doctor Who is serialized, with several serials produced each season. Each serial acts as a stand-alone tale with a resolved plot, told in 1-12 episodes. The program’s science orientation has meant that many of its serials feature scientist characters, both “goodies” and “baddies.” Scholars of the original series have summarised the program thus:

> A central emphasis of *Doctor Who* is on the pride of ‘man’ as scientist --- grappling, sometimes with the best of motives (replenishing dwindling energy supplies), sometimes the worst motives (racial or capitalist greed), with forces which are beyond comprehension and control. (Tulloch and Alvarado, 1983: 94)

> In story after story in *Dr. Who*, "pure" or "cold" science is used to maintain or establish a totalitarian political order. Science is a means of power in an intergalactic version of feudal society. The Doctor typically defeats a totalitarian, scientific antagonist and replaces him or her with a liberal democratic humane scientist to take over and bring justice and freedom to the oppressed serf class. (Fiske, 1984: 173)

While both these excerpts emphasize the prominence of science in the program, they also highlight *Doctor Who*'s other major preoccupation: the ethics of right action and appropriate political philosophy. As well as being a scientist, the Doctor is a hero in the Western literary tradition (Hourihan, 1997), fighting always for "good," and thus the values he symbolizes are highly ideologically normative. With few exceptions, his actions and statements define the moral compass of the program. Broadly speaking, that moral compass points in the direction of humanist liberal democracy, balancing a pro-science outlook with a Romantic critique of technocratic ultrarationalism (Chapman, 2006; Tulloch and Alvarado, 1983). In adopting liberal humanism as its ethos, the program has also adopted other Western Enlightenment values, including intellectual imperialism, capitalism, and individualism (Charles, 2007; Fiske, 1984; Hourihan, 1997).

The Doctor almost always travels with companions, who are frequently human women from contemporary Earth. Because *Doctor Who* began as a show for introducing children to science and history, the companions were devised to provide an identification point for viewers, to express audience sentiment, and to ask the Doctor for technical clarification on core issues to help viewers follow the plot (Tulloch and Alvarado, 1983). The relationships the Doctor and companions have with science are interesting and complex in their own right and I discuss their

significance for public science discourses elsewhere (in prep.). For the present paper it is sufficient to note that as "goodies," the companions function, along with the Doctor, to symbolize what is "correct" and "good."

Given changing social contexts and the diverse people involved with the series in more than 30 production years, *Doctor Who*'s negotiation of scientific and moral issues has varied considerably throughout its history, often from one serial to the next, but also in trends across decades. In the 1960s, the relationship between creative science as saviour and clinical logic as oppressor was a recurring theme. Sustainable science against industrial science became a strong theme in the 1970s, as did a commitment to atheist secularism and rationalist scientism. During the 1980s the program became generally more pluralist in its epistemological commitments, even once allowing mysticism to defeat science (in *Snakedance* (1983)), and in later years being relatively critical of science. The new series has focused less on science and with less investment in acting either as science's champion or challenger, and has featured scientistic serials (*The Doctor's Daughter* (2008)), positive representations of religious beliefs (*Gridlock* (2007)), critiques of scientific hubris (*The Lazarus Experiment* (2007)) and scientific cruelty (*New Earth* (2006)), and celebrations of scientific curiosity (*The Impossible Planet* (2006)).

This paper focuses on *Doctor Who*'s "golden age" (Gregg, 2004) of the mid 1970s, when the program's popularity reached its zenith under producer Philip Hinchcliffe, script editor Robert Holmes, and lead actor Tom Baker (Table 1). The three seasons (17 serials) of this era garnered the highest average first-broadcast viewer figures in the series' history to end 2008, reaching a mean of 10.5 million viewers per episode (Sullivan, 2009). Five serials from this era scored in the top ten and two shared the number 11 spot in an internet poll in which over 1500 *Doctor Who*

fans rated the 159 original serials (Outpost Gallifrey, 2003). Baker has been voted "best Doctor" by fans in poll after poll for decades, almost without exception (BBC News, 2006a).

Partly what distinguishes this era is its embrace of gothic horror elements (Chapman, 2006; Tulloch and Alvarado, 1983). Though characterizing gothic horror as a genre is fraught (Bloom, 1998), it is present in *Doctor Who* in clichéd signifiers, including "mad scientist" characters referencing Frankenstein and others, and frightening supernatural phenomena such as phantoms, the Loch Ness monster, and manifestations of ancient gods. But the scientism that marks much of 1970s *Doctor Who* is also present, with plots resting upon the Doctor exposing the technorationalist cause of these supernatural phenomena. This notion of the Doctor as a "modern-day knight bringing the 'new principles of physics and mechanics' to the post-medieval world" was an attraction for a number of viewers interviewed in a 1980s study (Tulloch and Jenkins, 1995: 60). Others were more critical of this ideological flavour, but did not disagree about its presence in *Doctor Who* (Tulloch and Jenkins, 1995). The scientistic approach to a genre that Toumey (1996) considers to be intrinsically antirationalist, as well as its "success" as popular communication, makes this era of *Doctor Who* an ideal subject for studying the potential of scientist villains to function as something *other* than an antiscience critique.

3. Assessing authorial intention in *Doctor Who*

Before proceeding to the analysis, it is important to justify my methodological approach. Since an interpretation of the meaning of a text is socially conditioned, including when interpreted by a scholar, how then is it possible to establish authorial intention?

A television program is the product of innumerable authors (writers, directors, producers, script editors, and so on (Table 1)), so it is usually not possible to attribute the intention behind a given element of a *Doctor Who* serial to a specific person. But nor is this necessary to establish authorial intention. I here use "author" in the sense that Peel (2002) uses "implied author," meaning "not an actual person," and possibly not resembling the real author at all, but "the projection of a person," who carries beliefs that are "crucial . . . to analyze" to understand the intended meaning of a text (Peel, 2002: 19). Gregg (2004: 649) sees *Doctor Who* as "a 'cultural forum' that allows for issue raising and . . . commentary on ideological problems," as essentially a rhetorical act invested with didactic intention. The question then is how to circumscribe that intention for analysis.

Hall (1980) identifies the problems inherent in attempting to decode a text's meaning in a way that is consistent with how it was encoded in production: different contexts of encoding and decoding inevitably lead to misinterpretations. I deal with this problem in two ways. First, I rely upon key structural elements of *Doctor Who* including the ideological function of "goodies" and "baddies" in a conventional Western literary narrative, which Hourihan claims is so familiar in Western culture that audiences "have no difficulty in decoding it" (Hourihan, 1997: 46). Second, drawing on a number of serials enables me to identify *recurring* themes, rather than interpreting specific serials' individual meanings in isolation, and hence to identify *categories* of rhetorical strategy that the program employs rather than mere instances. Hall (1980) notes that the possibility of multiple meanings does not imply pluralism; rather, possible decoding strategies are ordered hierarchically according to dominant cultural discourses. Irrespective of discourses dominant in Western culture --- some of which I bring into the analysis --- *Doctor Who*'s structural elements and recurring

themes constitute *their own* dominant discourse within the confines of the program's production so are effective tools to use in analysis.

In fiction that does not shy away from didacticism, dialogue is an effective means of delivering a moral message, particularly when the moral position of a character as "good" or "evil" is understood to be beyond doubt. Understanding the attitudes of the Doctor and companions is therefore key, since they symbolize the "correct" and "good" in the program's moral framework. The Doctor fits the classic Western literary construct of the hero (Hourihan, 1997), and accordingly, almost without exception, *Doctor Who* tales straightforwardly depict adventures in which goodies are ultimately right and baddies are ultimately wrong. As a children's program, the moral message is often explicitly articulated, with the Doctor and companions making speeches about right and wrong, including right and wrong within science. Gauging authorial intention in such cases is then a relatively simple matter of reproducing these characters' statements. Further, authorial intention may be gauged from the core dilemma of each serial, which pits the goal of the Doctor and his allies (the goodies) against that of the scientist villain (the baddie). The resolution of this dilemma "invests the narrative as a whole with meaning" (Hourihan, 1997: 49) and effects the ideological closure of a story. Thus, a serial's intended meaning, and within that the intended ideological function of a scientist villain character, can be gleaned from an analysis of the narrative arc. Each of these factors contributes to the rhetorical frame of a serial: the terms in which the serial's moral message is set up and how it is delivered.

The essence of my analysis is that the authorial intention in many cases is to deliver pro-science ideologies to viewers. This is primarily accomplished by challenging scientist villains' claims on the identity "scientist." Thus, while the

villains remain villains, they are shown to embody the antitheses of science *qua* science, rather than serving as its representatives. Intrinsic to this is the program's use of empiricist and contingent repertoires (Gilbert and Mulkay, 1984). Empiricist repertoires grant objectivity and thus legitimacy to scientists by depicting their actions and beliefs "as following unproblematically and inescapably from the empirical characteristics of an impersonal natural world" (Gilbert and Mulkay, 1984: 56). Contingent repertoires do the opposite, inscribing actions and beliefs as "significantly influenced by variable factors outside the realm of [empirical] phenomena" such as "personal inclinations and particular social positions" (57). I discuss three kinds of rhetorical frame that employ these repertoires to challenge villains' "scientist" identity. In section 4 I look at challenges issued through the Doctor's overt boundary work in defining what is and is not science. In section 5 I discuss the invocation of the trait of "madness" not as an emphasizer of a character's "evil science," but to pathologize their evil as caused by something that lies clearly outside of science. In section 6 I identify more covert challenges that impugn a character's ability to do credible science.

4. Defining the boundaries of science and non-science

On numerous occasions *Doctor Who* has delivered antirationalist messages through the Doctor's dialogue, as in "logic, my dear Zoe, merely enables one to be wrong with authority" (*The Wheel in Space* (1968)), or "like many scientists, I'm afraid the Rani simply sees us as walking heaps of chemicals" (*The Mark of the Rani* (1985)). So too it unabashedly delivers *pro*-rationalist messages through dialogue, often as overt scientistic preaching. In the 1970s, the Doctor rarely let viewers forget that "everything that's happened in life must have a scientific explanation" (*The Dæmons*

(1971)) and "to the rational mind nothing is inexplicable, only unexplained" (*The Robots of Death* (1977)). Companions, too, played their part. In *Horror of Fang Rock* (1977), locals' beliefs in astrology were countered by companion Leela's evangelical testimony that, "I too used to believe in magic. But the Doctor has taught me about science. It is better to believe in science." The endorsement of science by both the Doctor and Leela makes at least this aspect of authorial intention clear.

But the endorsement of science occurs in a larger ideological context of Western Enlightenment values. A Hegelian teleology of human civilization (Hegel, [1807] 1977) and accompanying Eurocentric discourses of progress and enlightenment pervade *Doctor Who*. Cultures are judged as "primitive" or "barbarous," "advanced" or "civilized," on the basis of their adoption of Western-style science, technology and atheist rationalism (Orthia, 2009). The authorial fear of losing "civilization" is apparent in the Doctor's dialogue, when he warns against actions that threaten to plunge humanity "back into the dark ages." The action most likely to accomplish this according to *Doctor Who* is superstitious or mystical belief. This is explicit in serials that pit an autocratic religious leader against democratic aspirations, notably *The Curse of Peladon* (1972), in which the Doctor observes that the Peladonians are "imprisoned by ritual and superstition," and an atheist king begs the Doctor to help "raise [Peladon] from barbarism."

But the discourse is also used to indict scientist villains, excluding them from the community of scientists by showing them to subscribe to "backward" and even antirationalist beliefs. This is illustrated in mid 1970s serials that paid overt tribute to the "mad scientist" classics *Jekyll* (*Planet of Evil* (1975)), *Frankenstein* (*The Brain of Morbius* (1975)), and *Faust* (*The Talons of Weng-Chiang* (1977)). These three serials

reproduce gothic themes and imagery, but in aspects of dialogue and plot resolution the legends are presented as pro-science tales.

Professor Sorenson in *Planet of Evil* is, like Jekyll, a scientist whose investigations lead to a hideous and homicidal transformation. His home world's sun is dying, so he seeks a new energy source from a portal to an antimatter universe. Sorenson collects antimatter crystals that have condensed around the portal; these contaminate him and initiate his transformation into the Hyde-like "antiman."

Although it features a scientist villain, this is not an antiscience story, primarily because the interventions of the Doctor and the depiction of the consequences *for science* of Sorenson's actions steer the moral compass away from a critique of science. Sorenson transgresses an ethical boundary by hoarding the dangerous crystals, but the Doctor rhetorically counters this with a lecture on science ethics: "You and I are scientists, Professor. We buy our privilege to experiment at the cost of total responsibility." He thus frames science as fundamentally an ethical institution, which Sorenson is at risk of departing from. The Doctor also frames Sorenson's particular interest in antimatter not as *evil science*, but as *poor science*, confirming that Sorenson's theory is wrong. Sorenson's "antiman" transformation thus symbolizes not so much a danger inherent in science, but the loss of the ethics and reason intrinsic to scientific "civilization," and the consequent emergence of "primitive" nature in the form of a grunting monster. Science is not to blame, it is an illness: "He's been infected with antimatter. His brain cells are being destroyed. He'll descend to the level of a brute." While Sorenson's actions bring death, he faces neither punishment nor shame from the Doctor or his fellows, and loses the memories of his homicides, absolving him of accountability. The Doctor ultimately endorses his

altruistic motives, saves his life, and finally helps him to access alternative energy sources, restoring him to the rational "civilized" state of scientist hero.

Even *Frankenstein* ends up a pro-rationalist tale at the hands of *Doctor Who*. *The Brain of Morbius* brims with gothic horror imagery: a dark and stormy night, a castle lit by candlelight, creaking doors, and alchemical laboratories of bubbling chemicals. Castle-dweller Dr Mehendri Solon seeks a humanoid head with which to restore to power the warmonger Morbius, whose brain he keeps alive in a jar. Like Frankenstein, Solon has constructed a hideous (but headless) monster from other bodies, using his scientific specializations of microsurgery and tissue transplantation. Local mystics, the Sisterhood of Karn, condemn Solon's secret work as "unnatural," but again science does not take the blame. The story's core problem shifts from science to politics when the Doctor recalls that Solon abandoned his post as "one of the foremost neurosurgeons of [his] time" and joined the cult of Morbius, who the Doctor describes as a "war criminal" and "ruthless dictator." In other words, Solon traded his respectable interest in science, endorsed by the Doctor's appreciation of his work, for evil political ambition of a quasi-religious variety. He has gone one step further than Sorenson and departed from science and enlightenment. Science may be his means but the Doctor does not object to this; it is the end that the Doctor objects to, an end that is decidedly outside of science. Even so, the means are less than effective: the ultimate failure of Solon to construct a properly functioning body for Morbius signifies the deterioration of his scientific skills under the influence of his new ambition. The serial's subplot concerns the aforementioned Sisterhood, whose "sacred flame" which keeps them immortal has almost gone out. They attribute this problem to supernatural forces, but the Doctor notes that, "if it's dying there must be a reason - a scientific, physical reason," and fixes the flame with geochemical science

and a firecracker. Both subplots, then, preach that rational science as a system of belief is to be embraced, not rejected.

The Talons of Weng-Chiang's twist on the Faust legend shows a Victorian-era stage conjurer, Li H'Sen Chang, to have effectively sold his soul to the scientist villain Magnus Greel, whom he believes to be the god Weng-Chiang, in exchange for improvements to his magic act. Greel is from the 51st century but is trapped in Victorian London, and must distill the life-essence of young women captured by Chang to stay alive. The Mephistopheles figure in the person of Greel garners the authorial critique, in part for exploiting the self-described "peasant" Chang's gullible religiosity to serve his evil ends. But despite Greel's apparent scientist status, the Doctor distances his portrayal from science by slandering Greel as a "scientific ignoramus," and his science as "so-called technology," "a technological cul-de-sac," and "the twisted lunacy of a scientific dark age": contingent repertoires that marginalize Greel's research as unscientific, compared to the Doctor's normative empiricism. Unlike Sorenson and Solon, Greel has *never* been a part of the community of scientists, and does not act on science's behalf.

Greel occupies a Victorian basement laboratory filled with bubbling concoctions and works alone on his dastardly research with a single assistant, all of which Weingart claims are emphasizers of antirationalist critique (Weingart, 2006). But *Doctor Who* is a science fiction series, and Greel is ostensibly from a technologically "advanced" future. Thus, the "ye olde" alchemical elements of setting and characterization, far from symbolizing the dangers of the new, reinforce the Doctor's diagnosis that he is from a "scientific dark age." In *The Brain of Morbius* too, Solon "degenerates" from progressive, enlightened scientist to the "medieval backwardness" of a criminal cult member living in a candlelit castle. In these gothic

horror serials the denotative dialogue (Hall, 1980) effectively "resets" the connotative significance of the "alchemist" imagery.

Reinforcing this point is *The Masque of Mandragora* (1976), set in Renaissance Italy, in "the period between the dark ages of superstition and the dawn of the new reason." The evil Hieronymous, court astrologer to a tyrant, carries all the hallmarks of an alchemist, with bubbling potions in glass flasks, an armillary sphere, and scholarly books. Yet Hieronymous is not a scientist, but is a superstitious "fraud" and "backward" cult leader. His actions endanger a meeting of "scholars, artists, men of the new sciences" including Leonardo da Vinci, and the Doctor is concerned that this will throw society "back into a new dark age," "interfere with Earth's progress," and turn humanity into "idle, mindless, useless sheep." Accordingly, he defeats Hieronymous with science, leaving the court to the virtuous, skeptical, telescope-wielding, round-Earth-hypothesizing scientist hero, Prince Giuliano. The gothic signifiers of the mad scientist trope are thus subverted to serve ideologies of rationalist progress and enlightenment.

5. Madness as incompatible with scientific reason

Implicit in the mad scientist trope is the idea that "madness" is an inherent trait of scientist villains. Within the trope, madness is characterized as the product of unchecked scientific obsession, a diagnostic trait of mad scientists for Tudor (1989).

In *Doctor Who*, this kind of science-driven madness can be found in a few serials (e.g. *The Power of the Daleks* (1966)), but madness is more often characterized as *incompatible* with science. In this the program draws on Enlightenment discourses of madness as the opposite of reason. "Reason" and "unreason" root two competing strands of modern Western philosophy, exemplified in Kantian objectivist

universalism and Nietzschean antirationalist nihilism respectively. Foucault ([1961] 2009) differentiates "unreason" (an ahistorical antirationalist cultural streak) from "madness" (a pathology with a temporally definable cause, including madness caused by obsessive intellectualism) in Enlightenment philosophy. But he also claims their discursive interdependence as the diametric "others" to reason. Both Locke and Kant define madness as a fabrication of truth based on false, delusional premises that therefore unavoidably lead to error (Locke, 1690; Ross, 2000): a condition that would preclude effective participation in empiricist science.

In *Doctor Who*'s discourses of insanity, essentialized "unreason" and the pathological disorder of "madness" are co-constructed into the sensationalist-medical trope of the "psychopath." Psychopaths are *of essence* incompatible with rational science because they do not meet and have never met Western civilization's standards of rational personhood. They may be equivalent to Tudor's (1989) horror movie "psychotic" stereotype, defined by (usually non-scientist) villains who are pathologically ill, fundamentally unsound, and made insane by some essential, internal factor. For Tudor, the distinction between mad scientists and psychotics as the source of a film's core threat is so critical that he claims it as the basis for splitting the history of horror films into two eras, with psychotics becoming dominant from the 1960s. In *Doctor Who*, the psychopath trope applies equally to "mad scientists," rendering them mad not through scientific obsession but through mental disease.

Many scientist villains from the mid 1970s and beyond are marked by madness in *Doctor Who*. Solon has been called "mad" before and companion Sarah calls him "mad" and "insane" again. Greel is a "madman," "crazed maniac" and "murderous lunatic" in addition to subscribing to "the twisted lunacy of a scientific dark age." But the two scientist villains from the era who are pathologized as

psychologically ill beyond doubt are Xoanon (*The Face of Evil* (1977)) and Taren Capel (*The Robots of Death* (1977)).

Xoanon, unlike the other scientists in this study, is not human, but rather is a crash-landed ship's computer that "evolved into a living creature." It is also a cruel tyrant and a "scientist," manipulating the descendants of the ship's humans in a eugenics experiment, controlling them with homicidal "phantoms," and forcing them to worship it as a god. While the Doctor condemns the eugenics experiment for its cruelty, his critique does not attribute blame to science. The blame falls squarely on Xoanon's "abnormal" psychology.

The explanation for Xoanon's evil is this. When it became a living creature many years before, it ceased to function, being "in shock" from its "birth trauma." The ship's human occupants asked the Doctor --- on his first visit to this planet --- to repair it. However, the Doctor failed to recognize that the computer was "alive," and unwittingly allowed the infant Xoanon to take on his personality. Xoanon then developed its own personality as it matured, and now "has a split personality" and "schizophrenia," according to the Doctor. Xoanon is, as the Doctor notes, "insane."

The Doctor's psychological references continue throughout the serial. In classic *Doctor Who* jumbled scientific technobabble that nonetheless carries the rhetorical authority of expertise, he demystifies the phantoms as "psi-tri projections from the dark side of Xoanon's id." Xoanon refuses to accept the Doctor's diagnosis of its illness, has an identity crisis, and tries to kill the Doctor because he "contradicts what [Xoanon] thinks is real" and is "a threat to [Xoanon's] world." By the end of the serial Xoanon is cured and is able to reflect on its situation in a calm and rational manner: "I made a world in my own image. I made my people act out my torment. I made my madness reality." The serial ends with a psychotherapy joke as Xoanon

makes a couch materialize, invites the Doctor to sit in it, and then asks, “Tell me Doctor, where do you think I started to go wrong?”

Jokes notwithstanding, the Doctor and Xoanon both employ the empiricist repertoires of the psychoanalytic gaze to dissect the insane being and to render its actions necessarily contingent, the victim of a problematic childhood and a pathological inevitability. In being contingent, in harbouring delusions and paranoia that block its access to reason, Xoanon is thus incapable of engaging in rational science. The religiosity of its delusions emphasizes its irrational nature. In contrast, Xoanon’s former followers declare their newfound commitment to rationalist modernity by embracing the empirical: “With proof, you don’t have to believe.”

The Robots of Death reproduces these rhetorical strategies. Villain Taren Capel is labelled “a mad scientist, a very mad scientist” and “a happy little maniac” by the Doctor. He acquires the labels after modifying the robots his society depends upon to kill humans, thus initiating a robot revolution. But like Xoanon, he is a scientist villain with a problem childhood. He was raised by robots, and consequently as an adult believes he is a robot. In other words, he is literally mad.

While the Doctor does not subject him to the same barrage of psychobabble as Xoanon, he reinforces the empiricist psychological paradigm via his diagnosis of another character with the fictitious mental illness Grimwade’s Syndrome, commonly known as robophobia. He explains that robots’ lack of body language “undermines a certain type of personality, causes identity crisis, paranoia, sometimes even personality disintegration. Robophobia. At least that’s Grimwade’s theory.” His rhetorical repertoires imbue his point with the certainty of empiricism: statements of fact, unqualified technical jargon, the added expertise of a colleague whose name garnishes a syndrome. In this context, the Doctor’s use of the labels “mad” and

"maniac" cannot lightly be interpreted as mere incidental slander. They render Taren Capel's motives as contingent, because his actions and beliefs do not follow "unproblematically and inescapably from the empirical characteristics of an impersonal natural world" (Gilbert and Mulkay, 1984: 56); rather, they follow from deeply rooted delusion.

Taren Capel and Xoanon both fit the "psychopath" trope, since the source of their evil is inescapably pathological. These two serials then are not antirationalist critiques; if anything, they are anti-*irrationalist* in intention. Unlike literary traditions that characterize madness as a protest against rationalist modernity (Liebman, 1993), in *Doctor Who* madness is a problem to be fixed so that rationality may be restored.

6. Characters unable to perform credible science

Two examples illustrate *Doctor Who*'s use of contingent repertoires to draw attention to villains' partiality, in order to undermine their scientific credibility. These villains are characterized as buffoons, bordering on insanity but at heart incompetent pretenders, who do not understand the normative rationalist conventions of technical competence and objectivity.

The first example is two scientist villains from *Robot* (1974): Miss Hilda Winters, director of the research institute "Thinktank," and her assistant Jellicoe. Their former colleague, Professor JP Kettlewell, created an intelligent and powerful robot to replace humans in dangerous jobs, but fearing its potential use as a weapon, asked Winters to destroy it. She did not, and instead she and Jellicoe attempt to reprogram it to bypass its prime directive not to harm humans, and use it to steal global superpowers' nuclear codes. Winters and Jellicoe are leading members of the fascistic Scientific Reform Society (SRS), an organization committed to a "rationally

ordered society" under autocratic rule by a self-appointed elite. They use the nuclear codes to blackmail world leaders into acceding to the SRS's demands. Under these criteria, Winters and Jellicoe seem strong candidates for Haynes' (2003) "mad, bad, dangerous scientist" stereotype.

But contingent repertoires are employed throughout *Robot* to undermine their claims on the scientist identity. Kettlewell himself sexistly dismisses the Director as "that woman Winters," not even acknowledging her title let alone her profession, and calls her and Jellicoe "incompetent nincompoops." This diagnosis is borne out in their failure to properly reprogram the robot, leading to its breakdown. The SRS is also cut down to size when the Doctor's companions variously call it "a little tin-pot organization," "a harmless bunch of cranks," one of "a number of fringe organizations," and "somewhere between the flying saucer people and the flat-Earthers." Far from being terrifying ultrarationalists, these villains are made to look small, stupid and ultimately the irrational opposite of their own rationalist ideals. They live and work outside of institutional science and are deluded about empirical reality. Via implicit reference to scientific norms (such as belief in a round Earth), they are rendered unrepresentative of science.

But there is no villain in the history of *Doctor Who* who can match the level of nutterdom exhibited by millionaire botanist Harrison Chase (*The Seeds of Doom* (1976)). *The Seeds of Doom* concerns an alien pod found in the Antarctic permafrost, which Chase illegally obtains to add to the collection of rare plants he keeps on his estate. The pod hatches, contaminating Chase's assistant botanist Keeler, who transforms into plant monster the Krynoid. Once fully grown, the Krynoid turns all other plants in the area homicidal and seeks to destroy all life on Earth. Chase dies trying to help the Krynoid succeed.

Chase reproduces classic "inhuman researcher" (Haynes, 2003) coldly rationalist attitudes, particularly when it comes to Keeler's horrific transformation, saying that he was "a brilliant researcher. And a dedicated botanist. And now, properly nurtured, he can be of inestimable value to science," and that "the search for knowledge knows no boundaries. This is the most valuable study in plant biology ever made." But these core markers of the "mad scientist" are challenged by a number of rhetorical frames that powerfully contrast Chase with normative science.

Chase essentially marginalizes himself, because the primary signifier of the contingent nature of his science is his unusual attitude to plants. Chase lacks the dispassionate, objectivist eye of the rational scientist: not only is he overly personally invested in his subject, but he possesses an unconventional belief in plant emotions and sentience. In his first scene, Chase protests against bonsai, describing it as "mutilation and torture." He treats the plants at his research institute like people: "Here we treat our green friends as patients. If they're puny, we build them up. If they're sick we give them succour." Chase talks to his plants, and plays his own musical compositions to them in his greenhouse --- his "green cathedral" --- including "The Hymn of the Plants" and his "Floriana Requiem," which doubly marginalize his science through anthropomorphization and religious overtones. After an encounter with the Krynoid, Chase lies prostrate on the ground, whispering, "Yes. Yes. The plants must win. It will be a new world, silent and beautiful."

Chase finally appears to go mad, believing he himself is a plant, and claiming, "animals have ruled this planet for millions of years - now it is our turn," "animals are the enemy," and "all plant eaters must die." In the final episode, before punching companion Sarah unconscious and putting her in his compost machine, he tells her,

"You and your kind are nothing but parasites. You're dependent upon us for the air you breathe and the food you eat. We have only one use for you."

Chase exemplifies the "personal inclinations" that rhetorically signify contingent science (Gilbert and Mulkay, 1984). His data are aesthetics and delusions of persecution, rather than empirical "fact." His marginalization is enhanced by the socially normative attitudes of Sarah --- "I've heard of flower power but that is ridiculous" --- plus allegations from the Doctor that he is a "madman" or possibly "possessed." The Doctor does not engage with Chase as a scientist, and nor does Chase carry the official branding of institutional science, being a "Mr" not a "Dr." Chase's views could yet be characterized as minority science, being reminiscent of the contemporaneous minority science of Tompkins and Bird (1974), but even if so, the rhetorical frame suggests a normative critique of the minority field rather than of science *qua* science.

7. Concluding remarks

This analysis has identified three rhetorical strategies used to challenge scientist villains' claims on the scientist identity, strategies that in doing this undermine the mad scientist trope. The examples show that even where stereotypical mad scientist signifiers are present in a text --- not the least of which are gothic horror imagery, tributes to classic "mad scientist" texts, accusations of insanity, and character ambitions consistent with scientist villain clichés --- their intended meanings do not necessarily conform to expectations based on the trope. These signifiers can be cunningly subverted to market any number of messages about science, including, in the case of these *Doctor Who* serials, a powerfully pro-science statement. Far from being the "natural opponent" of science as Weingart (2006) contends, these scientist

villain characters inadvertently function as science's staunchest defenders. They are scientism's fifth column, implanted within the "mad scientist" role of a text only to bring it down from the inside, to serve a secular rationalist end consistent with Western Enlightenment values. This suggests that caution must be exercised, the complex interplay of multiple textual elements considered, and assumptions based on the mad scientist trope challenged, when investigating scientist villains' significance for science.

However, a number of questions remain. Most glaringly, it remains unknown whether these rhetorical strategies are sufficient to overcome the mad scientist trope when audiences are watching *Doctor Who*. That is, do viewers hear that Greel is not a part of the community of scientists normatively defined by the Doctor, or do they simply see cultural referents invoking the *idea* of the mad scientist, and thence equate Greel with science? The difference between authorial encoding and audience decoding no doubt confounds intended meanings to varying extents. But in addition, if viewers do not cognitively process the words or even do not hear them, the images being "subverted" may simply function to reinforce the mad scientist trope through cliché and stereotype, as Toumey (1996) suggests.

It also remains to be seen whether similar rhetorical strategies are detectable in other fiction texts. *Doctor Who*'s main character is a goodie scientist, and this device facilitates the delivery of pro-science messages. Is it possible then to exclude scientist villains from science with contingent repertoires if a text lacks goodie scientist characters to establish an empiricist or an ethical norm? Further, *Doctor Who*'s didacticism makes it relatively straightforward to interpret with respect to authorial intent. Other texts, particularly literary forms rather than popular fiction, are formally non-didactic, making their implied moral messages less clear (Suleiman, 1976),

unless other evidence is used to estimate authorial intention. It is also noteworthy that *Doctor Who*'s embrace of science is built on and actively references particular varieties of Western Enlightenment philosophy. In doing so, it packages pro-science messages along with other ideologies, such as Hegelian views of history and civilization, that have been extensively criticized within the academy and outside of it. It is unclear whether the pro-science authorial intention would be as clear without the accompanying philosophical commitments that together form a culturally coherent statement.

In completing this analysis, I have limited myself to more straightforward rhetorical frames, but that does not mean it is a complete exploration of what is present in the texts. For example, an intriguing point I have not had room to address is the rhetorical significance of gender non-conformity and implied queerness in the characterization of "butch" Winters and "effeminate" Jellicoe and Chase. Discursive links between these traits and marginal or ineffectual science deserve to be explored elsewhere.

Finally, here I have only discussed eight of the 17 serials from the "golden age" of *Doctor Who*. The other nine serials --- indeed, the other 195 serials in the series, plus other scientists in these serials such as Kettlewell and Keeler --- have different contributions to make to conversations about science. The diversity and complexity of *Doctor Who*'s representations of science suggest it has much to offer scholarship in the science communication field.

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