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DISCUSSION

The Decline of Western Science: Defending Spengler's Account of the End of Science: Within Reason

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Abstract
Haack classifies Spengler's views on the end of science as what she terms *annihilationist* in that he forecasts the absolute termination of scientific activity as opposed to its completion or culmination. She also argues that in addition to his *externalist* argument that Western science, as cultural product, cannot survive the demise of Western Culture, Spengler also puts forward an *internalist* argument that science, regardless of the imminent demise of Western Culture, is in terminal decline as evidenced by its *diminishing returns*. I argue against Haack that Spengler's argument for the *diminishing returns* of modern science is in fact an *externalist* one, in that he locates the sources of science's current decline outside the discipline of science itself, attributing them to a change in cultural attitude towards scientific endeavours. I further argue that Spengler's prediction of the imminent end of science was directed specifically at pure science, and that he in fact held that applied science would continue to develop. I also take issue with Haack's suggestion that Spengler's views on science were outmoded at the time that he wrote them.

Keywords Spengler · Haack · End of science · Annihilationism · Diminishing returns

1 Introduction

Of all Spengler's prophetic pronouncements in *The Decline of the West*, it is those concerning the end of science that have received attention in recent years, most notably from Susan Haack. Spengler, notoriously, argued that the end of Western science was nigh, and that "from our standpoint of to-day, the gently-sloping route of decline is clearly visible" (Spengler 1926, 424). Spengler's insistence on the imminent 'death' of science smacks of the fantastical and tends to reinforce the prevalent view of Spengler as something of a crank, detached from the reality about which he philosophises. Haack, for her part, seconds this view, suggesting that Spengler's claims about the imminent death of science were based upon an outdated nineteenth-century view of the field's diminishing fertility.

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My purpose in this paper is threefold. Firstly, I wish to argue against Haack's suggestion that Spengler's views on science were outmoded. I suggest that a close reading of the first volume of *The Decline of the West* indicates that Spengler was cognisant of major developments in the science of his day. A reconstruction of his views on science, when placed in their proper context, indicates that his claims of the 'end' of science might be more grounded in historical data than they first appear. Secondly, I wish to problematise Haack's characterisation of Spengler's account of the end of science in terms of an internal account of diminishing returns by suggesting that an external account accords better with Spengler's writings. And thirdly, and perhaps more importantly, I wish to suggest that standard interpretations of Spengler's position on the end of science, including Haack's, are at least partially mistaken. I argue that Spengler predicted the imminent demise of pure science only, and in fact foresaw a clear future for applied science. Whilst Haack's treatment of Spengler does little to support my defence of his 'end of science' claims, the analytic categories that she develops in the course of that treatment are nonetheless invaluable in clarifying Spengler's claims.

I make no claim about the accuracy of Spengler's predictions concerning the fate of science, nor the originality of his insights. My purpose here is limited to the assessment of the role he has been allotted in intellectual history as one of the foremost doomsayers of modern science. I suggest that if we restrict ourselves to what Spengler actually wrote about the nature and trajectory of modern science then a rather different picture of Spengler's position on science, and his predictions of its end, emerges. And, by means of a brief survey of some of the main currents of thought about science of his time, I make the tentative suggestion that perhaps the understanding of science upon which he based his predictions was not an altogether unreasonable one.

2 Defining Spengler

Haack analyses the different notions that are frequently conflated in statements made about the imminent or hypothetical 'end' of science, and suggests categories into which one might separate them. Haack's general categories are of considerable utility in unpacking the differing senses of 'end' that Spengler employs in his claims concerning the end of science. In the course of her analysis Haack does consider specifically Spengler's views on science, and critiques some of his positions. Whilst I will consider Haack's criticisms later in this paper, it should be noted that Haack's key value for the analysis of Spengler's scientific views lies in her analytic categories, and their ability to explicate the different levels of Spengler's argument, rather than her own views on the credibility of Spengler's arguments.

Regarding the various statements made concerning the 'end' of science, Haack differentiates between those who use 'end' in the sense of annihilation, and those who use it in the sense of culmination and/or completion. When used in the former sense, the 'end' of science refers to a terminal point in time at which science ceases completely. When used in the latter sense, the 'end' of science refers to a point in time at which science achieves a certain level or outcome. This might be the development of some grand account of all natural processes, or the attainment of a point where the "answerable questions are all answered" (Haack 2007, 335). The key distinction between the two senses is that with 'end' understood as annihilation all scientific activity comes to a halt, whilst with 'end' understood as completion/culmination it is the progressive development of science that comes to a conclusion or plateau. Science as an activity, in this last sense, is not terminated.

Haack also distinguishes between *internal* and *external* accounts of the end of science. With an *internal* account, one locates the cause of the end of science (whether understood as annihilation or completion) in the factors or forces that lie *within* science itself. Whereas with an *external* account, one seeks these causes outside science. Thus, predicting the end of science due to the discovery of a Theory of Everything would be an *internal* account, whilst predicting its end due to the collapse of Western civilisation into barbarism would be an *external* account.

Turning to Spengler, it appears that he does view the end of science as a distinct, even imminent, possibility. The question then is whether he views the end of science as the annihilation of science or its culmination and/or completion. Haack, with some justification, places Spengler firmly within the *annihilationist* camp. Spengler, she argues, foretells of the terminal decline of Western science, in tandem with the decline of Western civilisation, and its inevitable death. Haack then separates Spengler's *annihilationist* outlook into three distinct arguments. Firstly, she argues, Spengler alters the social status of science. She calls this process "epistemological demotion" whereby Spengler places science on the same level as music or art, reducing it to the status of just another "cultural construct" (ibid., 331). The effect of this reduction in epistemological status is to make the idea of science's demise more credible. After all, few would view the statement that the art style of a particular culture does not survive the death of that culture as particularly implausible. Indeed, some might view that outcome as inevitable. If science is a cultural activity of no inherent difference from that culture's other activities, then there seems to be no good reason to insist on its survival beyond the demise of its host culture. The second argument that Haack identifies in Spengler's position is that the death of Western science is imminent due to the imminent death of Western civilisation. Haack also detects a third, minor, theme in Spengler's *annihilationist* position. Spengler, she claims, predicts that in a short while there will no longer be any great scientists, only 'gleaners' eking out the last dregs of scientific potency. Haack calls this the "*diminishing returns*" argument.

Haack's analysis is extremely helpful in identifying the different aspects of Spengler's position on the end of science. It is also, I would argue, largely correct. However, the omissions and slight mistakes in emphasis when taken together tend to result in a distorted impression of Spengler's actual views on the subject. Turning to the first of Spengler's positions, that concerning the epistemological demotion of science, Haack is essentially correct in her analysis. Spengler does indeed characterize science as a cultural product. However, it should be recalled that Spengler characterizes practically every aspect of human existence as a cultural product in that each aspect expresses the prime symbol (Ur-symbol) of a particular culture. And Haack seems to be implying that Spengler's portrayal of science as a 'mere' cultural product is motivated by his wish to justify his claims about the end of science. Firstly, it seems a little drastic for Spengler to identify *all* human activities throughout history as cultural products merely to justify a claim about the imminent demise of Western science. Secondly, even if I am misreading Haack's intentions here, the fact that Spengler argues that all human activities are cultural products does not mean that he views all cultural products as epistemologically equivalent. Indeed, science for Spengler, particularly mathematics and physics, represents *the* quintessential Faustian cultural product.[1] That is to say that for Spengler they express most purely the cultural imperative

[1] Faustian culture is Spengler's term for Western culture which he views as having come into existence around 1000 AD.

given by the Faustian Ur-symbol, and play the primary role in the construction of reality for the members of that culture.[2]

Regarding Haack's account of Spengler's second argument, that the demise of Western science is in the offing due to Western civilisation's terminal state, I have little to dispute. Spengler does indeed hold science to be a cultural product. He also argues that cultural products cannot survive the death of the culture-organism in which they arose. Finally, he argues that the end of Western culture is nigh, and with it Western science. With the third argument that Haack identifies, the idea of the *diminishing returns* of science, things are a tad more complicated. Haack prefaces her discussion of the different types of argument for the end of science with a brief history of science, or perhaps a history of scientists' perceptions of the state and trajectory of science (ibid., 330–331). She notes that at the close of the nineteenth century it was widely accepted that science had passed its peak, that the major discoveries had been made and the key principles uncovered. What remained to science was the application of the above. Haack then observes that by the early years of the twentieth century this view of science's near completion had been swept away by the sudden advent of new discoveries (X-rays, electrons, etc.) Haack seems to suggest that Spengler is maintaining the nineteenth-century attitude in the face of contradictory evidence of science's continuing fecundity. And Haack's interpretation of Spengler's position is not without support. Spengler's statements that "Western physics is drawing near to the limits of its possibilities", and that in physics, chemistry, biology and mathematics "the great masters are dead, and we are now experiencing the *decrescendo* of brilliant gleaners who arrange, collect and finish-off" (Spengler 1926, 417, 424), strongly suggest that Spengler does indeed believe that science is nearing its completion and that little remains for it to do but work out the details of application.[3]

However, with her interpretation of Spengler's third argument Haack has given a decidedly *internal* account of the end of science. Spengler, says Haack, believes that science is at an end, and now exhibits *diminishing returns*, due to the fact that science has attained its own, internal objectives, presumably an account of the fundamental principles of all natural processes, or as close to one as the human intellect can attain. Now, this may well be correct. As I said before there is evidence to show that Spengler may well have held this position. However, there is far more evidence to suggest that Spengler advocated an *external* account of the phenomena of science's *diminishing returns*. This is not to suggest that an *internal* and an *external* account are necessarily mutually contradictory. I would rather argue that there is a stronger case to be made for Spengler advocating an *external* account.

Spengler's argument for the *diminishing returns* of scientific activity, when taken as an *external* account of the end of science, has more to do with public perception of the status and relevance of science than it has to do with science nearing its completion. Science, in Faustian culture, has for several centuries been the most prestigious form of cultural activity. What Spengler predicts will bring about the end of science, in the specific sense of *diminishing returns*, is a sea-change in the public's perception of the value of the scientific enterprise. "The soul of the Culture itself has had enough", Spengler claims (ibid., 424). The diminishing energies of Faustian culture in its final centuries is reflected in a loss of intellectual energy. Society loses its interest in 'truths' of the external world. Its gaze shifts from without to within. The truth of natural processes comes to be less important

[2] See Swer (2017).

[3] Although if this is the case then it would appear that Haack has undermined her case for treating Spengler as dyed-in-the-wool *annihilationist*, by establishing that he was also a *completionist* in this regard.

than practical efficacy, or even the pursuit of internal truths. The rise of Spengler's 'brilliant gleaners' is due to the death of the 'great masters', and the fact that no new masters arise to take their place. Spengler states that, "science exists only in the living thought of great savant-generations, and books are nothing if they are not living and effective in men worthy of them" (ibid.). Without the public fascination with science, there are no new generations of scientific-savants to replace the old and maintain the continuity of intellectual development. And, according to Spengler, "an orgy of two centuries of exact scientificness brings satiety" and the culture expresses its collective lack of interest "by putting into the field of the day ever smaller, narrower and more unfruitful investigators" (ibid.). The rise of the gleaners is not the result of the completion of science, nor the lack of men of requisite genius, but the end of public interest in scientific proof and the movement of men of genius into other fields of human activity. As Spengler puts it, "it constitutes the death of a science that no one any longer regards it as an event" (ibid.).

A further point to be raised about Haack's analysis of Spengler's third argument concerns the type of science that Spengler is describing. What the culture has grown weary of is 'exact scientific-ness'. It is "exact science" that Spengler says "must presently fall upon its own keen sword", rather than science *in toto*, as Haack suggests (ibid.). And it is in exact science, by which I suggest Spengler means 'pure' science, that we see the ascendance of the gleaners and the death of the masters. The shifting cultural mores bear witness to a loss of concern with truth and the dissection of the natural world, and a greater concern with extensive power and practical efficacy. In place of exact science, it is the activities belonging to the "matter-of-fact side of life—to politics, technics or economics" that receive public interest and Cultural endorsement (ibid., 425). And it is in technics and *applied* science that, for Spengler, the future lies.[4] Thus, it is the death of Western culture that will bring about the annihilation of Western science *in all its forms*. It is Cultural ennui, brought upon by the aging of the culture-organism, that brings *exact* science to a standstill.

Given the above it seems unlikely that Spengler would have held, as Haack argues, that science (or more precisely, exact science) might come to its culmination. In other words, that Spengler would endorse an *internal* account of the end of science. However, as I stated above, this is not necessarily the case. Spengler does hold that the end of science is imminent, and whilst he might think it unlikely, at no point does he rule out the possibility that

[4] One can interpret this endorsement of applied science and technics over pure science as a sign of Spengler's commitment to what Herf calls "reactionary modernism", an intellectual current amongst conservative revolutionaries of the Weimar period that combined a quasi-mystical reverence for modern technology with a rejection of Enlightenment values (Herf 1984). I do not explore this topic here for the following reasons. Whilst I have no issue with Herf's concept of reactionary modernism, nor his location of Spengler within this movement, I suggest that Herf's depiction of Spengler as a reactionary modernist is rendered problematic by his assumption of philosophical continuity across Spengler's oeuvre. Recent scholarship on Spengler has argued, following Koktanek's (1968) suggestion, that Spengler's thought is best understood as having two phases (see for instance Farrenkopf 2001; Conte 2004). It is Spengler's later work, particularly *Man and Technics* (2002), that best conforms to the contours of reactionary modernism, whilst it is his early work, particularly *The Decline of the West*, Volume 1, that features the cyclical model of world-history for which Spengler is best known. Herf, and most commentators, tend to conflate the two periods in Spengler's thought and read Spengler's later social Darwinist *Lebensphilosophie* back into his cyclical philosophy of history. The bearing of the above on this paper is that it is in Spengler's early work that we find his analysis of science and, more specifically, his account of the end of science. Whilst it may well be the case that Spengler's early work is also imbued with the features of reactionary modernism, at present this fact has not yet been established, and indeed cannot be established until sufficient work has been done on reconstructing the role of science and technology in Spengler's *early* philosophy. And it is to this latter task that this paper hopes, in a small way, to contribute.

exact science might be completed, by the production of some Theory of Everything perhaps, in the time remaining. The fact of the matter is that the establishment of such an ultimate theory is, in and of itself, of no staggering importance to Spengler. If exact science does produce a Theory of Everything that theory, Spengler maintains, will *not* bring about ultimate knowledge of reality. Merely the ultimate knowledge of the human construction of reality. Far more important for Spengler is the belief that *applied* science remains a viable, ongoing form of praxis. Indeed, though a full elaboration of this point lies beyond the scope of this paper, the fact that applied science retains its creative potential is fundamental to the ultimate objective of Spengler's *Decline of the West*. Namely, the mobilisation of technological resources in the overcoming of the ahistorical *ennui* of contemporary technological civilisation.

2.1 Spengler and Contemporary German Science

Whilst I might dispute Haack's intimation that Spengler is attached to an outdated, even for his own time, view of the state of science, she does raise the interesting question of to what extent Spengler was either in or out of step with the scientific thinking of his time. I would argue that whilst Spengler's views on the nature and trajectory of modern science may sound outlandish, they do in fact reflect (to some extent) both the current state of German science in his time, and some of the main currents of informed reflection on the philosophical significance of that state. In support of this assertion, I will consider Spengler's philosophy of science in connection with key scientific trends of the period. Namely, the trend towards a phenomenal understanding of science amongst both among philosophically informed scientists and philosophers, the synthesis of disparate branches of scientific activity, and that which Schnädelbach terms the *dynamisation* and *temporalisation* of German science (Schnädelbach 1984, 81). I reiterate that the following analysis is not intended to serve as an endorsement of Spengler's views on science but rather to suggest that, contra Haack, they were not implausible at the time that he wrote them.

The phenomenalist, or descriptivist, view was a theory of science that developed out of the increasing adoption of empiricism as *the* philosophical model for natural science in the nineteenth and early twentieth century. Initially employed against Idealist conceptions of the nature of science, the anti-metaphysical implications of empiricism were then turned against the materialist conception of science as well. This movement for the exclusion of metaphysics from science was characterized by what Schnädelbach (1984) terms the rejection of essentialism and deontologisation. Physics was to restrict itself to the description of phenomena, and avoid synthetic knowledge that is independent of experience. Concepts that concern the essence and substance of nature were to be eradicated, and only those that enable the expression of functional relations between phenomena were to be employed.

The resulting "post-materialist, post-mechanist" outlook of the phenomenal or descriptivist view was briefly in the ascendant during the second half of the nineteenth century in Germany. It held that "physics consists in nothing but the most precise description possible of the observable phenomena, in which the so-called laws of nature have as their only function to make descriptive economy possible" (ibid., 87). Laws of nature, like the principle of causality, were expressions of observed phenomenal connections and were to be interpreted descriptively.

Spengler's theory of science does, in part at least, appear to correspond with this phenomenal view. The phenomenal view advocates a progressive movement away from

materialist metaphysics towards a deontologised model of physics whose primary function is the analysis of functional relations between phenomena. And Spengler, in his analysis of the current character and future trajectory of Western physics, described just such an ether-realised physics operating at a level of abstraction far removed from the substantiality of our experiential world, the "disembodiment of the world in the service of space" (Spengler 1926, 184). Granted for Spengler this is due to Western civilisation's yearning to actualize their Ur-symbol of infinite space, but if we put Spengler's world-historical models aside for one moment, it does rather appear that the model of science he describes and interprets is very similar to the descriptivist model of science to which Haack appears to connect him.

If this is the case it does lend some support to the argument that Spengler's philosophy of science, at least in this regard, was sensitive to actual scientific practice, or natural scientists' understanding of their practice, of the period rather than just his own speculations. It should also be noted that the phenomenal view had fallen out of favour by the early decades of the twentieth century, in part as a result of the dispute over atomic theory. Thus, if one takes a Whiggish view, it seems to be the case that even if Spengler did base his model of science on actual scientific practice or self-understanding, he chose a defunct and discredited theory of science to use as a foundation. Furthermore, the heyday of descriptivism had passed by the time that Spengler came to write *Decline*. Thus, the theory of science he used as a model, whilst not belonging to the distant past, was already somewhat *passé*.

This seems to fit with Haack's suggestion that Spengler's views on science are not just outdated, but that they were so even when he wrote them. Haack was referring here not to Spengler's descriptivist leanings, but his predictions regarding the end of science. Haack notes that declarations of science's imminent completion were rife in the closing decades of the nineteenth century but had largely been forgotten by the turn of the century, and the following decades, in the flurry of new scientific discoveries (Haack 2007, 330–331). Spengler, writing in 1918, again appears to be espousing a lost cause, and, furthermore, one that most people would have considered well lost even in 1918. Spengler's views, when thus considered in comparison with the history of science and science reception in Germany, appear less fantastical and more warranted in one sense, whilst at the same time appearing as somewhat antiquated. Spengler seems less the "philosopher-hierophant" and more of a crank, clinging to yesterday's understanding of science in the face of all evidence to the contrary.

The reality, I would argue, is somewhat more complicated than this. Although, as above, a case can be made for the dated nature of Spengler's scientific views, even by the standards of his contemporaries, there is in fact far more evidence to suggest that Spengler was a more prescient and informed observer of contemporary developments in science than has hitherto been suspected. Considering Spengler's correspondence with the phenomenal view of physics, it is by no means obvious that the decline of this position has any necessary consequences for Spengler's own model of science. The key elements of the descriptivist position are present in Spengler's account, it is true, but are thoroughly absorbed in his own fictionalist philosophy.[5] The focus on functional relations between phenomena, and the anti-materialist rejection of essentialism, are key aspects of Spengler's characterization of modern science, but they operate on a meta-level. They are aspects of the nature of Western science that one can detect if one views Western science as a dynamic whole from without. Science, for Spengler, becomes increasingly functional as it moves

[5] The fictionalist character of Spengler's philosophy of science was, to the best of my knowledge, first noted by Merlio (1980) who attributes it to the influence of Vaihinger.

towards its conceptual omega point, "pure numerical transcendence" (Spengler 1926, 427). Its treatment and representation of the phenomenal world becomes decreasingly sensuous. However, this does not commit Spengler to the descriptivist programme for the conduct of present science. For Spengler, the etherealizing movement towards mathematical transcendence is a trajectory, a course science follows and whose progressive development one may trace through all periods of Western science including those in which essentialist, ontological theories were dominant. Etherealising is what happens underneath the historical passage of competing scientific metaphysics. It matters to Spengler not a whit whether current or future scientific theories espouse materialist metaphysics. Scientific metaphysics, for Spengler, are useful fictions. So long as they further the increase of science's power and facilitate the increasing mathematisation of science, they serve their purpose.

All that might be said of descriptivism is that it has a better sense of the ultimate destination of science than most. This does not, however, commit Spengler to endorsing their model of science against other, more powerful or more useful models. Indeed, Spengler's discussion of atomic theory strongly suggests that he felt it to be a better theory in that it furthered the Will-to-Power over Nature and thereby the culturally mandated actualization of the Will-to-the-Infinite. "The atomistic notions of modern physics", he writes, "—which include not only the Daltonian or 'chemical' atom but also the electrons and the quanta of thermodynamics—make more and more demands upon that truly Faustian power of *inner vision* which many branches of higher mathematics (such as the Non-Euclidean geometries and the Theory of Groups) postulate" (ibid., 385).[6] The atom of Western physics is an abstract quanta of energy, "an extension-element conceived without regard to sensible quality of any kind, which eludes all relation with sight and touch, for which the expression 'shape' has no meaning whatever […]. Such, already, were Leibniz's 'Monads' and such, superlatively, are the constituents of Rutherford's picture of the atom as positively-charged nucleus with planetary negative electrons, and of the picture that Niels Bohr has imagined by working these in with the 'quanta' of Planck" (ibid.). The 'metaphysical' atomic theory thus furthers the etherealizing tendency of modern science. With regards to the progressive fulfilment of the Faustian project, I would argue that this amounts to a ringing Spenglerian endorsement of atomic theory. It should also be noted that the passage just quoted does not support the characterisation of Spengler as ignorant of or hostile to contemporary developments in twentieth-century science.

A further feature of Spengler's account of science that also appears to be drawn from contemporary developments in science concerns scientific synthesis. Spengler states that, "the separate sciences—epistemology, physics, chemistry, mathematics, astronomy—are approaching one another with acceleration, converging towards a complete identity of results" (ibid., 425). The nineteenth century witnessed, in addition to a tremendous increase in experimental knowledge, the unification of diverse scientific theories and methods. Schnädelbach notes that in physics after 1830 "the most important innovations were the result of integration" (Schnädelbach 1984, 77). The integration of magnetic and electrical phenomena by Oersted led to the theory of electromagnetism, which Faraday connected with mechanics, and Maxwell and Hertz with optics, resulting in electrodynamics, which in turn eventually led to Einstein's special theory of relativity (Wise 1990). This unification also occurred between, rather than just within, the sciences. Schnädelbach offers the development of physical chemistry as an example. Chemistry, encroached on biology first as

[6] Note here the recurrent themes of the Faustian character: inwardness, unimpeded vision, the convergence of mathematics and physics. Atomic theory, on Spengler's account, sounds inherently Faustian.

organic chemistry then as biochemistry. And Biology received a new theoretical foundation in the form of physiology, which itself arose as the result of the application of chemical analysis to the processes of life (Morgan 1990).

It was this tendency towards unification, and the fruitful overlapping of separate fields, that I argue lies behind Spengler's sense of the progressive amalgamation of the different sciences, underpinned by mathematical physics. Justifying his predicted convergence of science, he points out that, "even a century ago, physics and chemistry were foreign to one another, but to-day they cannot be handled separately—witness spectrum analysis, radioactivity, radiation of heat" (Spengler 1926, 425–426). And continuing his observations on recent developments in science, he connects the convergence of the sciences with their increasingly mathematical nature, "While 50 years ago the essence of chemistry could still be described almost without mathematics, to-day the chemical elements are in course of volatilizing themselves into the mathematical constants of variable relation-complexes […]. Physiology is becoming a chapter of organic chemistry and is making use of the methods in the Infinitesimal Calculus. The branch of the older physics—distinguished according to the bodily senses concerned in each, as acoustics, optics and heat—have melted into a dynamic of matter and a dynamic of the aether, and these again can no longer keep their frontiers mathematically clear" (Spengler 1926, 426).

It is on the basis of these trends towards convergence and increasing mathematisation present in the science of the period, I argue, that Spengler developed his account of the nature and trajectory of Western Science. And it is again on the basis of those actual trends that he formulated his account of the end product of scientific development, "a fusion of the form-worlds, which will present on the one hand a system of numbers, functional in nature and reduced to a few ground-formulae, and on the other a small group of theories, denominators to those numerators, which in the end will be seen to be myths of the springtime under modern veils, reducible therefore—and at once of necessity reduced—to picturable and physiognomically significant characters that are the fundamentals" (Spengler 1926, 425). The sciences converge, underpinned by a few master formulae of mathematical physics and science's ineradicable metaphysical component. One can see here the parallels with the descriptivist programme with the emphasis on the functional character of the ultimate stage of science, but it should be noted that the metaphysical content, the theoretical rendering of the culture's Ur-symbol derived worldview, remains for Spengler an essential component of science.

However, Spengler's scientific outlook was not shaped solely by conceptual and experimental advances in science and new currents in contemporary theorizing on the nature of science. I argue that a significant part of Spengler's theory of science derives from his observation of and philosophical reflection upon more socio-cultural aspects of the development of science in his lifetime. In particular, Spengler's writing suggests that he was acutely aware of the alterations taking place in the relationship between science and industrial activity, and within the social organization and practice of science. And also aware of the simultaneous, and causally connected, alterations in the science's own understanding of the nature of knowledge and scientific method. In other words, his philosophy of science attempted to understand the nature of modern science in a social and economic context, and as a form of praxis.[7] His consideration of the more '*internalist*' aspects of science

[7] Even Musil, who took Spengler to task for his sloppiness and imprecision in employing mathematical concepts, conceded the validity of his points regarding the cultural and social shaping of scientific activity (Musil 1990).

upon which Haack lays emphasis, as considered in the preceding paragraphs, is thus balanced in his writings by a constant awareness of these '*externalist*' factors.

The late nineteenth and early twentieth century was a period of radical change in Germany, both within and between science and society. Traditional societal structures, and structuring forces, were weakened in the wake of industrialization, whilst the social status of science grew enormously. Meyer-Thurow states that

> the relationship between science and industry changed in a decisive way. Invention was industrialized. Large company laboratories were set up. The consulting scientist and the scientific entrepreneur were replaced by the salaried industrial research worker. Applied science became a driving force for technical development and economic growth (Meyer-Thurow 1982, 363).

This change in status, as Meyer-Thurow suggests, stemmed from an alteration in the function of science. Schnädelbach, likewise, states that "in modern industry, science, as fundamental inquiry and technology, has itself become a productive force." And this in turn was itself made possible because the new, modern conception of science was "inherently technologically applicable" (Schnädelbach 1984, 67). The vital role that modern science played in industry further increased its social standing and this, coupled with the loss of traditional forms of social order, led to many within society looking to science to provide new forms of social ordering. Newly integrated with industrial forces science, having dissolved Germany's social bonds, and was now looked to for the forging of new ones. Its new economic importance was thus reflected in its burgeoning social influence.

Science's new position within industry also resulted in more internal changes within the social organization and cognitive ethos of scientific practice. As science settled into its new role as motor of the industrial revolution, its social structure began to reflect that of the industrial world in which it found itself. The role of scientist became increasingly professionalized, in order to ensure productivity, and science became increasingly subject to the division of labour, "that is, specialization in science, and its organization into institutions of a quasi-industrial sort" (ibid., 68). That is, science was reorganized into a variety of specialist areas with their own methodologies, and the role of specialist became a professional career (Morrell 1990, 982–984). Along with this specialization and professionalization came depersonalization. The new science was no longer conceived of as a system of static truths developed by one or several particular individuals, but a collective enterprise of anonymous researchers whose progress is contingent upon the application of procedural rules. These rules are independent of the personality of the individual researcher and can, in principle, be acquired and applied by anyone.

The above changes in the social organization and practice of science corresponded to an alteration in the way in which scientific knowledge itself was conceptualised. Schnädelbach here notes a process at work within science, which he terms *dynamisation*. This process is apparent in the triumph of empiricism within science of the period. A science whose everyday function is to maintain a process of innovation amenable to industrial development has become a research-science. 'Science' no longer refers to the content of science, a body of universal and necessary truths, but the empirical procedure employed for acquiring and testing knowledge. And it is these procedures that confer upon a theory its 'scientific'

status. Thus experience, of a suitably 'scientific' kind, takes precedence over theory, and theories become viewed as "intermediate stages on the way to knowledge, on which further progress can be made only by means of experience" (Schnädelbach 1984, 88). Theory, now understood as the systematization of 'scientific' experiences, is held to be open to constant revision in the light of new experiences. Innovation is internalized as a guiding principle of modern science and science is conceived of as a dynamic process.

Thus construed, as a dynamic process of research, the previous model of science, as a static system of universal truths, is deferred to the future. It becomes a destination, a "regulative idea" and "no longer a concept which is constitutive of the reality of science in the present" (ibid., 89). The present of science rather is viewed as a transient stage on the way to this systematic destination, the ultimate aim whose attainment is guaranteed by effort in the present in accordance with the empirical procedures of science. Dynamic science is temporalized science, and it is characterized by what Plessner calls the "yearning for the spurious infinite" (Plessner 1974, 127).[8]

This digression into the history of science in Germany enables us to grasp more clearly the range and focus of Spengler's theory of science. Spengler's outlook does not divide neatly into *internalist* and *externalist* sections. Both aspects are present simultaneously in his work and the one frequently informs the other. Thus, when Spengler speaks of the rise of the 'gleaners' in modern science and the death of the 'masters', he is not (or at least not merely) bemoaning the declining calibre of contemporary scientists but rather noting the transformation taking place in the nature of the scientific enterprise. The new, industrially-allied research-science with its dynamic conception of science as process and method had displaced the old model of science as system. Spengler observed this process and is attempting to draw the reader's attention to the subtle yet significant way in which our understanding of science, both as knowledge and technique of knowledge-production had altered. Spengler's analysis of modern science, and predictions of its end, are designed to alert us to the fact that the very meaning of 'science' and the 'scientific' are not historical givens, but are themselves in flux. Science as knowledge has changed from a static to a dynamic conception. Science as an enterprise has become professionalized and depersonalized. And accordingly, the 'masters', that is the scholars and system-builders, are no longer required. Enter the 'gleaners', the researchers, the anonymous appliers of a shared process.[9] The 'truth' of what *is* is no longer what science is called upon to produce. Modern industrial science produces innovation in the field of scientific application. Society has become 'sated' with scientific 'truth', and seeks its practical applications instead, both in the sense of industrial products and in the sense of new social organizations to replace those eroded by industrialization. In this way, Spengler adds an extra stage to what is essentially the Comtean tripartite model of human history, from myth to metaphysics to science, and then from science to technology. And thus when Spengler speaks of the imminent death of 'science' in the pure, pre-industrial sense, he is not so much predicting an event still to come as describing an event in progress.

Even those sections of Spengler's writings in which he argues for the theory-ladenness of observation are themselves part of Spengler's efforts to identify and describe the new features of modern science. Spengler's account of the presuppositions of scientific

[8] Cited in Schnädelbach (1984, 89).

[9] The movement from individual to more collective science, and Spengler's occasionally disdainful tone in describing it, does seem to suggest that he saw in it the general cultural tendency to move from aristocratic individual genius to mass, democratic technique.

observation has as one of its primary objectives the analysis of one of the key features of the 'new' empirical and dynamic concept of scientific practice, namely the elevated role of scientific 'experience'. "Nothing", Spengler states, "seems to us more self-evident and unambiguous than 'experience' as the source of exact science" (Spengler 1926, 393). Experience, let us recall, had become the watchword for modern science in Spengler's time. Or, more specifically, experiences of an appropriately scientific sort were held to be the foundation of scientific knowledge claims. It was the scientific experiences that rendered such knowledge 'scientific'. And, in turn, it was the research procedure for acquiring and testing knowledge that marked an experience as 'scientific'. Thus experience holds primacy over theory, and theory is taken to be endlessly revisable in the light of such experience. However, Spengler's concern with scientific 'experience' operates at several levels. He wishes to direct our attention to experience's new role as the criterion of the 'scientific' and motor of scientific progress. "[E]xperiment, based on working hypotheses and employing the methods of measurement, is nothing but the systematic and exhaustive exploitation of this 'experience'", he argues, connecting the supposed experimental basis of modern science to the new, empirical concept of scientific experience (ibid.). He also wishes, via his argument for the theory-ladenness of observation, to establish that experience's conceptual priority over theory does not entail actual priority in practice. However, Spengler also wants to point out that this very concept of 'experience' has a peculiarly Faustian character. Its "aggressive dynamic connotation" implies a culturally specific worldview (ibid., 394). Experience, in the sense in which it is employed in this modern scientific concept, is for Spengler a purely Faustian concept. It is not to be found (nor could it possibly be found) in any culture other than the Western, nor could it hold meaning for any non-Faustians.

Experience means to us an *activity* of the intellect, which does not resignedly confine itself receiving, acknowledging and arranging momentary and purely present impressions, but seeks them out and calls them up in order to overcome them in their sensuous presence, and to bring them into an unbounded unity in which their sensuous discreteness is dissolved. Experience in our sense possesses the tendency *from particular to infinite* (ibid.).

Experience thus possesses a dynamic, extensive quality. As Spengler puts it, experience has a "causal element" (ibid.). Sensory-impressions are not passively received, but actively brought-forth. Regardless of the extent to which such experience is or is not underdetermined by theory, Spengler argues, experience itself is a quintessential expression of the Faustian cultural project.[10]

3 Spengler's Account of Science in Relation to His Philosophy of History

In closing, lest this paper give the impression that Spengler's views on science are somehow detached from the historical grand narrative of cultural cycles put forth in *The Decline of the West,* I will outline briefly the ways in which Spengler's views on the nature and practice of science relate to the theories of historical change for which he is best known. For Spengler, human history represents the rise and fall of culture-organisms, each of which has a finite lifespan and passes through specific developmental stages. Each culture

[10] Turning to Classical science, and its focus on the surfaces of self-contained bodies, Spengler notes that such a concept of experience would have seemed anathema to Classical scientists. He writes, "What for us is the way to acquire knowledge is for the Greek the way to lose it" (Spengler 1926, 394).

can be understood as a symbolic structure, erected around and dependent upon one master symbol, the Ur-symbol, from which all other culture-forms take their character. As each culture's Ur-symbol is unique, the symbolic structure that it underpins is likewise unique. Consequently, the cultural forms of each culture-organism are peculiar to it alone, and are comprehensible only within the worldview of that particular culture. Spengler also argues that cultures, like organisms, have a life-cycle and that each culture (barring the intervention of external forces) must necessarily pass through the same stages (birth, maturity, senescence, death).

Western science, as an instance of Faustian cultural activity, is itself an expression of the Ur-symbol of that culture. As such it is bound to observe the *destiny* of the West, that is to say, to continuously attempt to articulate the Ur-symbol of its culture in a context bounded and shaped by the fixed laws of the development of the culture-organism. And the death of science, properly understood, is but a manifestation, a minor instance, of the death of the Culture of which it is but a part.

In light of his position on the imminent downfall of Western Culture, Spengler's views on the imminent end of science do not seem all that surprising, and might perhaps be viewed as a less interesting symptom of a far more significant process. To focus on science, one might argue, is to miss the bigger picture, namely the death of an entire Culture and the force of destiny that drives the West inexorably towards its end. From such a perspective one might indeed query the value of Haack's analytic categories of external and internal accounts of the end of science. If the cause of the death of science is the death of Western culture, and if the cause of the death of Western culture is the mystical force of *destiny*, then attempts to explain the demise of science in terms of the internal organisation of science or the influence of social factors external to science would appear to be operating at the wrong explanatory level.

However, such an argument rests upon a number of misconceptions regarding the nature of Spengler's philosophy. Firstly, despite his occasional use of oracular and supernatural metaphors, I would suggest that there is nothing mystical about the Spengler's model of historical change. *Destiny* is not an other-worldly force, nor a term for some irresistible deterministic law of cultural development. Following Frye (1974), I argue that all that Spengler means by the term *destiny* is the idea that cultural entities form a cohesive symbolic unity such that at any point in the lifespan of a culture anything produced by a member of that culture will be a symbolic expression of that particular culture. Thus any symbolic production by a member of Faustian culture will, of necessity, be an expression of the Ur-symbol of Faustian culture. Consequently, Faustian science, whether pure or applied, early or late, likewise produces symbolic representations of the Faustian Ur-symbol.

The successive stages of a culture's lifespan are marked by changes in cultural mood.[11] The creative energy and self-confidence of a young culture eventually gives way to the scepticism and spiritual aridity of the terminal stage, a stage that Spengler terms *civilisation*. Consequently, when Spengler states that, "Civilization is the inevitable *destiny* of the Culture", he is not pointing to the operation of laws of history, but rather making a point that the difference between a culture and a civilisation is a matter of degree rather than kind (Spengler 1926, 31). That whilst there are significant differences between the civilisational stage and those that preceded it, the civilisation stage is still just as inherently Faustian as the preceding stages. As Hayden White puts it, for Spengler the difference between one

[11] See Swer (forthcoming).

cultural stage and another is a "difference in similarity" (White 2010, 253). Western culture, taken as a whole, represents a millennia-long effort to articulate the same symbolic structure, continuously mediated by alterations in the cultural mood. In the final, civilizational phase, Western culture reaches the limit of its possibilities for reinterpreting and rearranging its symbolic system. This is the 'death' that awaits Western culture.

The bearing of this on Spengler's views on science is as follows. Science, for Spengler, was not simply an instance of Faustian symbolic expression but the purest form, the one that came closest to understanding the metaphysical project of the culture. It is to science that one looks to catch a glimpse of the nature of the Ur-symbol and the existential state of the culture.[12] Spengler's historical grand narrative foretells the imminent end of Western culture, but at a certain factual remove. It is by means of his analysis of science that Spengler makes his historical abstractions concrete. The end of science, for Spengler, is a means by which to demonstrate the actuality of the West's demise and the validity of his historical model. The transition from pure to applied science, for Spengler, represents the passage from one cultural stage to another. The urge to science that fuelled the accomplishments of modern science was appropriate to a specific stage of Western culture, and reflected a specific mood. As that stage passes, that mood wanes, and a new civilizational mood demands practicality and extensive power over theoretical innovation and discovery. Hence the ascendance of applied science and the concomitant decline of pure science.[13] And thus both the internal and external causes of the end of science that Haack's categories allow us to identify are themselves equally Faustian expressions of a shift in cultural stages. And the application of Haack's categories enables us to see clearly the lengths that Spengler went to in order to trace the trajectory of Western culture in contemporary developments in the theory and practice of Western science. For the purpose of Spengler's model of world-history was always, ultimately, to better understand his own time.

4 Conclusion

Haack's analysis of Spengler's views on the end of science classifies them as what she terms *annihilationist* in that he forecasts the absolute termination of scientific activity as opposed to its completion or culmination. She also argues that in addition to his *externalist* argument that Western science, as cultural product, cannot survive the demise of Western Culture, Spengler also puts forward an *internalist* argument that science, regardless of the imminent demise of Western Culture, is already on its last legs as evidenced by its *diminishing returns*. Whilst I am in broad agreement with the above I argue against Haack that Spengler's argument for the *diminishing returns* of modern science is in fact an *externalist* one, in that he locates the sources of science's current decline outside the discipline of science itself, attributing them to a change in cultural attitude towards scientific endeavours.

[12] As Conte notes, it is not by chance that Spengler chose to bookend the first volume of *The Decline of the West* with chapters on science (Conte 2004, 20).

[13] Of course, the decline of pure science is not instantaneous and Spengler's position by no means requires that it produce no further theoretical innovations. It is rather than such innovations will no longer have the cultural impact that they once had, except amongst the remnant of science *aficionados,* unless they have clear practical implications.

I further argue that Spengler's prediction of the imminent end of science was directed specifically at *pure* science, and that he in fact held that *applied* science would flourish in the near future. I also take issue with Haack's suggestion that Spengler's views on science were outmoded at the time that he wrote them. I suggest that Spengler's views on science should be viewed less as *ex cathedra* theoretical speculations based on an outdated notion of science, and much more as an attempt to grasp the interrelations between changes in scientific practice and changes in its structural organisation, and between changes in science's self-understanding and changes in its social function and social standing. Moreover, Spengler also exhibits awareness that these interrelations are far from constant and were at the time of his writing in a state of flux. Spengler, in a way that prefigures the sociological turn in the philosophy of science, blurs the line between context of discovery and context of justification and paints an innovative image of science as a dynamic form of praxis, where the theoretical content is inextricable from its social organisation and cultural context.

In summary then, I have argued that a reconstruction of Spengler's writings on science and its demise in *The Decline of the West* reveal a rather different standpoint than that typically attributed to him, and that Spengler's account of science, whether or not one agrees with it, is far more complex and considered than the catastrophist stereotype to which he has been attached.

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