Do we really need World III? Information science with or without Popper

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1. Introduction

Reading through the literature, Popper's third World epistemological framework seems to be a popular basis on which to found an information science [6,23,31]. Though an advance on an earlier orthodoxy influenced by Shannon's information theory, which tended to be over-concerned with the hardware of the new age, with storage capacities, transmission rates and the like, this new model still tends to filter out the important aspects of information, and thus of information science. Specifically, the content of information and the context of its development, are neglected. In this paper I shall argue that any information science which does not seriously attend to these dimensions cannot hope to achieve credence as a serious discipline.

2. Popper's model

In his "Objective Knowledge" [26], Popper divides the universe into three: World 1 comprises physical objects, World 2 the world of subjective, mental states, and World 3 of objective knowledge —that is, of the contents of World 2: theories, ideas, concepts, artistic creations, and even the products of animals, structures like spiders' webs and birds' nests.

World 2 is thus responsible for creating the stuff of World 3, yet once created, this objective knowledge has its own volition: it is independent; it has its own ontological status. To illustrate this, Popper asks us to consider a situation in which our machines and tools and our knowledge of how to use them are destroyed. The return of civilization would then depend on whether or not the libraries survive (one can see his appeal to the information profession!). Of course, some might argue that even if a librarian could be dispensed with, some sort of literate being would be a *sine qua non* of reconstruction. Popper concedes this in the *proviso* that our capacity to learn from books must remain intact. In this sense, his "epistemology without a knowing subject" cannot really dispense with the knowing subject, be he human or alien. However, one can appreciate Popper's point, that knowledge, once recorded, can carry the thoughts of its author across space and time. (Whether or not they are actually the same when they reach the destination of a reader is a more contentious issue, to which I shall return.)

3. The subjective/objective division

Many of the problems of Popper's model come from a confusion of Worlds 2 and 3. Neill [23] criticises Brookes for this, but he is by no means the first to misread Popper here (Grove lists at least five others [13]). It is my contention that the confusion goes back to Popper, and his ambiguous use of the term 'objective' knowledge. For Popper, 'objective' means exosomatically recorded. Thus the poetry of Gerard Manley Hopkins is objective —though it depicts intense subjective (i.e. personal) struggle—simply because it exists on paper. 'Objective' has nothing to do with truth, indeed it must include more false than true knowledge, cf. [26, pp. 122, 148, 156]. As Barnes has pointed out, perhaps Popper should speak of third worlds in the plural, for "Galileo's rejection of astrology is a part of the third world, but what about the astrologer's assumptions?" [3, p. 73].

Yet if Popper truly means all recorded knowledge, "true or false, useful or useless" [26, p. 115], how can he later say, "We are workers who are adding to the growth of objective knowledge as

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masons work on a cathedral" [26, p. 121]? What sort of a cathedral would emerge from the objective knowledge that includes such propositions as "7 times 11 equals 66" [26, p. 156]? There is sleight of hand at work here: Popper is now using the term 'objective knowledge' in the sense of currently accepted 'correct' knowledge (a slip Brookes also makes when he speaks of 'the current consensus'). We either abandon his original usage or accept a plurality of third worlds, each with its own ground rules.

Similarly, Popper's use of biological analogies —the spider's web, the bird's nest (i.e. concrete physical objects)—are surely of a different order from the hypothetical constructs of science, some of which are subsequently abandoned; e.g. the existence of phlogiston, or more recently, 'polywater', a supposedly dense, viscous form of water with novel properties, researched at an international level for 5 years until found to be nothing but a laboratory artefact [11]. Other things, of course, are initially rejected, but return later to be accepted (see the example of Polanyi, below).

Popper cannot thus maintain such equanimity about World 3 knowledge or information (he uses the terms interchangeably), reducing it all to uniform dimensions, as though it were like gas or electricity. Yet this is clearly what he has done. It is hardly surprising that so many critics have misinterpreted his third world. Indeed, the variety of interpretations of objective knowledge would itself seem a strong case for a plurality of third worlds. Popper does admit that there are always plenty of misunderstandings of works [26, p. 115], but holds that the important thing is the potentiality of full understanding. This is the stuff that philosophers dream on, right enough, but it is hardly serviceable in the real, messy world of information science.

4. Social worlds 2 and 3

The world of information science, I would argue, is both constructed and sustained by its practitioners; a world where the logic of discovery and the logic of justification cannot be tidily distinguished but rather, a world where interests, success and resourcefulness play vital roles. In short, a social world, which must underwrite the whole idea of objective knowledge. But this is the one world which is singularly lacking in Popper (the sociological is curiously relegated to World 2). We leap from a World 2 of individual minds generating ideas to the third World of objective knowledge. (Brookes also has this abstract conception: "...the publicly observable growth of knowledge as recorded in the published literature reflects the ways in which individual minds think privately" [6, p. 131].) Where is society in this picture? My answer, to paraphrase the scholastics, would be that its centre is everywhere, its circumference nowhere. It underscores the whole process, and a realistic information science must reflect this fact.

Thus, on the one hand, the subjective World 2 mind is to a great extent constituted by objective knowledge (through language, mores, rules etc.), as Popper recognises. On the other hand, World 3 is itself socially influenced (*contra* Popper). A clear example of this is the past scientific consensus on the inferiority of women; more recently, there is the contentious issue of the mental inferiority of blacks. There is now a growing number of studies showing the interesting homologies between particular socio-cultural configurations and their knowledge structures: Darwinism in *laissez-faire* Victorian England [36]; the romantic, anti-rational social milieu of post-World War I Germany and the development of acausal quantum physics [10]; the symbolic, unifying role of the ether for Cambridge physicists, their involvement with psychical research and their assertion of the continuous radiation character of the newly discovered emanations (x-rays, gamma-rays, etc.) [34]. Of course, these studies are themselves a product of their time. They are suggestive; they do not give clear-cut divisions between the natural and the social. This would be as impossible to do as separating out the ingredients of a baked cake.

Were this simply a philosophical quibble the issue would be less significant. Unfortunately this uniform, levelling treatment of information as an abstract stuff has had its effect on the writings of many in the field of information studies. Stonier, for example, writing about the information society, speaks of information 'leaking', as water might, and causing the downfall of the Shah of Iran as a consequence [30]. The content of the information and the context of its development are completely ignored [29].

Stonier, both here and elsewhere, treats information as though it were a force for right, a platonic realm from which 'truth will out'. In

Popper too, though he would disavow the association with truth, we find the "platonic third world of books in themselves, theories in themselves" etc. [26, p. 116], as if they mean anything divorced from human actors. But unless we are prepared to accept a divine *Logos*, words clearly do not have these built in semantic boundaries. They become defined in use and change with changed usage. Barnes and Law have discussed this, how such concepts as mass and electrical resistance have altered over time. Even formulae vary between contexts:

> "'Copper sulphate' may refer to a variety of distinct crystalline materials, equal numbers of copper and sulphate ions in a solvent, materials of different degrees of purity which may be called 'mixtures' in other contexts, and so on." [1, p. 229]

Just as facts are not self-evident but capable of different interpretations, so too language is itself open to different readings. Popper oversimplifies when he speaks of the defining characteristics of the book. For him it is not whether it is read or understood that is crucial; rather, "it is its possibility or potentiality of being understood" [26, p. 116]. But is there any inherent, full understanding in the abstract? (And even if there were, who could ever judge if not a particular social group?) Or are there only different readings?—as of Darwin, as of Einstein, as of Popper himself. Again the third World of objective knowledge fragments into a series of third worlds.

This is a crucial point for information science, because different conceptions of the discipline hinge upon it. If Popper's third World model is accepted, then information is seen to inhere in things (books, problems, theories, etc.) which people may or may not understand. This is an essentially passive conception of information—and one which produces an information science that relegates the production of information to very low priority (if it recognises it at all, and does not consider it an issue for other disciplines). On the other hand we have a much more dynamic concept of information which says that it is meaningless to speak of information divorced from people (both creators and users). As Illich has put it, books and computers are vehicles for potential information. They only "yield information when they are looked upon" [15, p. 86]. We are the drivers, without us they are inert shells. Yet each of us brings different background knowledge to a text, and at different times the same individual has varying requirements and expectations. To adapt an ancient oriental saying: One cannot jump into the same text twice!

This dynamic quality should be seen to run right through the information cycle: meaning is temporarily harboured in papers, but this by no means finalises it. It will be informative to different readers for different reasons (its methodology, techniques, findings, etc.). The case of Mendel is particularly instructive here. He is still quoted in information science literature as the long neglected father of modern genetics. But according to Brannigan [4] he was not neglected, and he adduces citations of Mendel's work during the supposed dark age of its existence. Moreover, he was not really the father of genetics either; he was simply used as such by a particular group, the 'Saltationists', to outflank their rivals, the 'Biometricians'. Texts, then, are themselves resources for future workers, and are worked on as constructively as nature herself.

There is also a more basic, philosophical argument against the notion of an intrinsic meaning inhering in texts, as developed by Derrida and others, which shows how writings contain within themselves their own undoing, or 'deconstruction'. There is sufficient 'play' in language for it to harbour indeterminacies, ambiguities and myriad metaphorical resonances. In other words, texts are connotative rather than denotative [17].

5. Information production

Production is the crucial area of information science. Without it I can see no hope of it being a critical science. By this I mean digging beneath the surface of phenomena to see how they are constituted, rather than accepting them at face value. Unfortunately, much information science has opted for the latter course, adopting the model of the hard sciences and trying to 'mathematise' its findings.

What a study of information production reveals is that science is not a question of gifted individuals with creative insights putting up hypotheses which they then assiduously try to falsify in the arena of objective knowledge. Contrary to this storybook version, information is carefully con-

structed by socially located individuals, who are less interested in truth than success ('publish or perish'), who try to persuade by all manner of means the validity of their theories, and who, in the same process, hope to mine an area lucratively in terms of articles, research projects, without claim-jumpers muscling in. Thus concealment and obfuscation are as much practised as openness and communication—a state of affairs that goes back at least as far as Hooke publishing his law of elasticity as an anagram. However, before illustrating some of these issues, I would like to make it plain that I am not making any crude claims that social and psychological elements determine 'objective knowledge', nor that they taint this world; rather, that they are actually, in some degree, constitutive of that knowledge.

At the broadest level there is Kuhn's celebrated notion of the scientific paradigm—a general frame through which a scientific community views its field of study. Though its very broadness and comprehensiveness obscures much of the local texture of knowledge production, it does indicate how extra-scientific criteria operate. There is, for example, the celebrated case of Polanyi's theory of absorption of gases on solids, which although empirically valid, had to wait more than thirty-five years for acceptance because it did not fit the then current paradigm [25].

A similar situation can be seen in the controversial area of the paranormal. Here, despite rigorous adherence to scientific practices, findings are rejected out of court—unless, that is, they are negative, in which case they are much more likely to be published. Some critics have even declared themselves prepared to abandon statistical probability—a hallmark of scientific experimentation—rather than give credence to paranormal phenomena [7]. The cultural context of science clearly outweighs logic here. Of course, this is not to say that paranormal phenomena exist, simply that, by the criteria that science espouses, they should be rationally considered (like polywater, above)—not denigrated, their researchers shunned and snubbed (the persecution of Velikovsky and his academic supporters makes particularly sad reading [8]).

Mitroff's seminal work gives us more insight into this lack of objectivity in science; indeed, the elite band of geologists involved in the Apollo programme, who were the focus of his study, rejected scientific objectivity as a myth. Instead they saw science as involving intense emotional commitment, "warding off attack against what you've published" [21, p. 143]. This is the very opposite of Popperian falsificationism, though it is the hypothetico-deductive method of the latter which is written into that very bastion of informativeness, the scientific paper.

As information scientists tend to deal with the finished product, I shall spend some time unpacking this carefully concocted construction. Although I should add that the idea of its contrivance is by no means novel. Sir Peter Medawar considered it 'a fraud' back in 1963 [19]. Nevertheless, it is only recently that detailed studies have revealed just how the fabrication occurs. Knorr-Cetina has given us a very detailed study of some work in protein research which reveals how a paper invents its own problematic [16]. A chance finding is conceived as a solution to a particular issue. The paper is then cast in these terms: an objective enquiry into finding the already found. The impression in the paper is of a story unfolding with an incontravertible logic. As Gusfield has also noted, the scientific writer is as involved with drama and suspense as much as other writers [14].

Knorr-Cetina's examination of the method section demonstrates the lack of informativeness I mentioned above: problematic elements in the experimental procedure are not mentioned (thus giving the originator greater power); instead, the section has a formulaic quality, of following convention.

Other studies have recently turned to the literary strategies of scientific texts. What they reveal is a general persuasive rhetoric which tries to make the truth appear self-evident and natural, whereas contra-evidence, or the theory of an opponent, is exposed and slighted in any way possible [35]. The literature is full of these acrimonious disputes, of scientists 'warding off attack'. Robbins and Johnston [27] note a case of defamation arising between rival specialists. Regrettably it must be accepted that it is partly by these methods that knowledge claims proceed, rather than by following the tenets of logic in the arena of objective knowledge. Mahoney, in an experiment comparing scientists with relatively uneducated Protestant ministers, found that the former were not particularly adept at logical reasoning in any case [18, pp. 153–161].

The very language of scientific discourse is carefully crafted to shortcircuit possible criticism. Knorr-Cetina, in examing the 16 drafts of the protein research paper, notes how knowledge claims are tempered: 'should' becomes 'could', 'mainly' is modified to 'usually', and so on, making it harder to pin down, to criticise [16, p. 102]. Then there is the idiom of the writing, crafted to enhance the notion of objectivity. The subjective actors of World 2 become passive third-person, third World ciphers. The individual is carefully written out. Instead of making things happen, things are supposedly 'observed' by neutral recorders. It takes scientists of Nobel Prize status—like Crick and Watson—to transgress these conventions and survive.

Finally, there are the citations, beloved of information scientists. These also have a persuasive role. They are not simple accreditations given to useful third World products (in fact, as Edge has shown [9], they are often not given in this way). They also help to promote the author's work, to locate it in a particular tradition by citing that tradition's luminaries and thus hoping to convince that its arguments are thereby sound [12].

In short, papers actively participate in trying to ensure their own contexts of justification. Objectivity is written into their fabric. An information science which simply accepts the finished products cannot but misconstrue the nature of its subject matter. As one of Mitroff's scientists put it:

" 'You can't understand science in terms of the Boy Scout articles that appear in the journals. It's better to approach it as the chairman of a political party' " [20,p.65].

6. Information storage and processing

This area is often thought of as most passive. Whatever happens in the information world outside, the librarian/information scientist/indexer simply records/stores/retrieves/disseminates it as necessary. But even here subjects are actively reconstituted—often in ways contrary to a field's experts. Bates has evidence that those with subject knowledge of an area can be less likely to find relevant material in a subject index than those without it [2]. Also the various classification schemes are well known for their generally outdated and distorting treatments (e.g. psychology—still a part of philosophy in Dewey, or Christianity—still the religion *par excellence*). Thus, albeit the librarian does not tamper physically with the content of any particular text, he has to place each within the particular arrangement of knowledge operating in his institution, which obviously colours how an area is viewed, as would the subsequent discarding of particular texts.

With the advent of computer technology it might be thought that this unintentional distortion could be overcome, as material could be indexed under more objective descriptors. But this is a double-edged sword. This very objectivity might conceal some important dimensions of information; in particular, its origin. Prestel, for example, does not distinguish its advertising from other material. But even where blatantly commercial material is excluded, the other information is of by no means equal significance. At present, with databases drawing attention to articles produced in conventional serials, the recognised hierarchy of journals is clearly apparent. But with further developments (full-text storage, electronic journals, etc.) such indicators might no longer exist (hence the Royal Society's antipathy to the new forms of publishing [28]). It is not simply a straightforward hierarchy of prestige that journal titles convey, but also the philosophical, or paradigmatic slant of their content. In psychology, for instance, one finds behaviourist, cognitive, neurological and humanist oriented journals on similar topics. Admittedly titles are informative, but similar terms can mean very different things to different schools.

There is also the problem of terms changing meaning, as discussed above, so however objective the descriptors may be, distortion of subject matter is still an issue. Swift et al. [32] therefore rejected pre-arranged indexing schemes in favour of one which uses the terms in the original documents. This would seem a partial answer, and is decidedly preferable to suggestions that information scientists should become actively selective in their approach to information [5]—a move which would surely increase distortion and bias, especially as the criterion of selection would inevitably hinge on the current consensus, hence rejecting those ideas that do not conform (like Polanyi's theory, above).

Of course it is not only the information scientists who store and disseminate information. Writers of popular articles, standard texts and histories do this all the time, and likewise, actively

reconstitute it. For instance, in writing on the development of a discipline to the present—which, of course, is made to appear a logical outcome of the past—new genealogies have to be constructed to fit changed conceptions. This is evident in the case of the Saltationists' use of Mendel, quoted above. Similarly, psychology is now playing down its behaviourist image and is busy resurrecting more cognitively oriented ancestors, like Frederic Bartlett. But whatever changes are made, the result is a smooth narrative, with any discontinuities ironed out.

What the above really boils down to is a plea for the information scientist to have some awareness of the origin and social context of information, not just in its production but also as regards its storage and dissemination—for the active constitution of information is present here too. Such concern for the origin of stored information is clearly present in the French national report on the information society:

"Information is inseparable from its organization and mode of storage....Leaving to others—i.e., to American data banks—the responsibility for organizing this 'collective memory' while being content to plumb it is to accept a form of cultural alienation." [24, p. 80].

7. Conclusion

In the above I hope to have achieved two things. Firstly shown that Popper's third World is philosophically questionable; and even if it proves not so, that it is still unhelpful in the real world of information science. Secondly, that we must widen the remit of information science if it is to be a worthwhile discipline. That is, we should not take our material as the ready-made products of the information world without first critically examining how such things are constituted. In other words, look at the social context of information to see how it is both developed and sustained.

Popper's third World of objective knowledge seems particularly restrictive here, in that it reifies information; that is, detaches it from its producers so that it then comes to be seen as having power over those producers. It is in such a conception that many scientists have been able to shrug their shoulders over their more heinous creations and say that they are not responsible for what people do with them. This supposedly neutral conception of the scientific role is itself historically located, though itself a cultural product of the Restoration, when science had to curb its earlier cultural and educational concerns. For the learning of the Puritan Revolution was much concerned with human enlightenment and emancipation, with education, health and welfare; to their minds, "reflection upon the effects of science is part of, or condition for, science itself" [33, p. 38].

This contrasts with the later image of man the scientist as somehow separate from and above nature, thus permitted to manipulate and exploit his subjects, be they animal or human. It is interesting in this light to look at the more inclusive conception of science and technology in China. China had mechanical clocks, steam engines and moveable type centuries before the official Western dates, together with a commensurate science. What they lacked, interestingly enough, was an equivalent to the Christian 'rule of the Book'. There was no beyond, no platonic realm external to nature; rather everything was contained in their notion of the Tao [22].

This is obviously speculative, but I believe information science should be aware of the larger issues. The reification of information in objective knowledge automatically rules out such concerns. But an information science on these terms is surely trying to fashion a discipline from the tip of the iceberg. It is as misguided as the logical positivists defining their reductive notions as the whole of philosophy, or behaviourism seeing itself as psychology *in toto*: both take what is overt then proclaim that that is all there is.

If information science has an affinity with any other discipline it is surely education. Round neither can we hope to draw neat boundaries, for neither is constituted around any particular core subject. Instead they are meta-subjects, concerned, in the case of education, with how and why other subjects are taught: hence philosophical, sociological and psychological components are intrinsic to any educational course. Information science should take note.

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