International Studies in the Philosophy of Science

ISSN: 0269-8595 (Print) 1469-9281 (Online) Journal homepage: https://www.tandfonline.com/loi/cisp20

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To cite this article: Vasso Kindi (2017) A Reconsideration of the Relation Between Kuhnian Incommensurability and Translation, International Studies in the Philosophy of Science, 31:4, 397-414, DOI: 10.1080/02698595.2019.1565206

To link to this article: https://doi.org/10.1080/02698595.2019.1565206

INTERNATIONAL STUDIES IN THE PHILOSOPHY OF SCIENCE
2017, VOL. 31, NO. 4, 397–414
https://doi.org/10.1080/02698595.2019.1565206

Routledge
Taylor & Francis Group

A Reconsideration of the Relation Between Kuhnian Incommensurability and Translation

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ABSTRACT

Up to the introduction of the term and concept of *incommensurability* by T. S. Kuhn and P. K. Feyerabend in the early 1960s, scientific texts were supposed to pose no problem as regards their translation, unlike literature, which was thought very difficult to translate. After the introduction of the term, translation of scientific language became equally problematic because, due to conceptual and perceptual incommensurability, there was no common observation basis to ground linguistic equivalences between languages of incommensurable paradigms. This article highlights the presuppositions that link incommensurability to dramatic consequences (impossibility of communication, translation, and comparative evaluation of paradigms) and tries to sketch an alternative way of understanding incommensurability and translation drawing on Kuhn's work. From this perspective, translation is not an all-or-nothing affair for either science or literature and becomes a problem to be solved for each particular set of circumstances.

1. Introduction

Translation has been defined as 'the process of transforming a specific piece of one language (commonly a text of some sort) into another language' (Montgomery 2000, 4). The choice of the verb 'to transform' is apt, as translation has taken different forms in the course of history. It has varied from adaptation and accommodation to transformation and reconstitution; from *verbum pro verbo* (word for word) to *sensum de sensu* (sense for sense), from domesticating to foreignising translations (Burke and Po-Chia Hsia 2007, 26). Yet, despite the varieties of appropriation, translation has always centred on an original that was to be transferred to and made intelligible in another language and so has given rise to concerns as to whether it can ever be successful in the sense of being faithful to that original. It was thought, for instance, that it is very difficult, if not impossible, to properly translate a given text or phrase to a target language. The saying 'traduttore, traditore' expresses the dissatisfaction with any translation in comparison to the original. The translator is thought to be betraying the original author and the spirit or meaning of the text he or she translates. It is also thought that something is

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inescapably lost or distorted in rendering a text from one language into another (MacIntyre 1988; Polizzotti 2018).

In that sense every translation was thought to be a new creation. '[T]ranslation is often indistinguishable from creation' (Paz 1992, 160). In fact, according to Hugo Friedrich, in the Roman period we find a concept of translation that is not submissive to the source language, as we often think it ought to be, but rather understood 'as a contest with the original text'. The goal was 'to surpass the original and, in doing so, to consider the original as a source of inspiration for the creation of new expressions in one's own language'. Friedrich characterises this approach as 'cultural and linguistic imperialism, which despises the foreign word as something alien but appropriates the foreign meaning in order to dominate it through the translator's own language' (Friedrich 1992, 13).[1] Friedrich Nietzsche also uses the image of conquest in relation to translation during the Roman era but, in his account, the original meaning (of Greek texts) seems not to be preserved or superseded but rather eradicated:

> at that time one conquered by translating—not merely by leaving out the historical, but also by adding allusions to the present and, above all, crossing out the name of the poet and replacing it with one's own—not with any sense of theft but with the very best conscience of the *imperium Romanum*. (Nietzsche 2001, 83)

Here we have again, translation as new creation and at the same time as conquest and elimination of the original meaning. Progressively, however, interest in translation, on the part of philosophy, concentrated mostly on the issue of achieving fidelity to the original text.[2]

2. Translating Literature and Translating Science

The emphasis, as regards translation, was traditionally on the difficulties to translate literary texts, especially poetry.[3] Octavio Paz wrote, 'Woven of echoes, reflections, and the interaction of sound with meaning, poetry is a fabric of connotations and, consequently, untranslatable' (Paz 1992, 155). The fear was that the particular selection and weaving of words we find in literary texts that, through a rich variety of means (meter, imagery, rhythm, rhyme, harmony, puns, etc.), produces a certain aesthetic experience and a plurality of meanings,[4] cannot be reproduced and captured by any translation. Any particular translation is bound to lose some at least of the effects and meanings that resonate in the original and also have difficulties preserving and rendering literary style. That is the reason why any attempt to translate has been characterised as a 'utopian task', for instance, by José Ortega y Gasset, who believes that languages are incongruous: words from different languages point to different realities and have 'exceedingly incongruous' resonances, both emotional and intellectual (Gasset 1992, 93).

In contrast to literary texts, scientific ones were thought to be unproblematic as regards translation. The terms of science, Cleanth Brooks said, have fixed meaning that does not change with context: 'They are not to be warped into new meanings'. Unlike the words of poetry, which embody a nexus or a cluster of meanings, scientific terms are supposed to be pure denotations. Because they correspond to discrete particles of meaning, they come close to what Brooks takes to be an ideal language, namely, a language that would contain 'one term for each meaning, and the relation between term and meaning would

be constant' (Brooks [1947] 1960, 192). Ortega y Gasset admits that scientific texts are easier to translate in comparison to literature and attributes this fact to the use of terminology, which he understands as a kind of Esperanto, that is a language—he calls it a 'pseudolanguage'—agreed upon by convention. 'Actually, in every country these [the scientific texts] are written almost entirely in the same language' (Gasset 1992, 95).

In any case, scientific language was taken to be literal: straightforward and transparent naming of objects and description of facts, no figures or tropes of speech to obfuscate meaning. Karen Bennett explains how a shift in worldview during the Scientific Revolution in the seventeenth century contributed to the kind of scientific writing that was thought to facilitate the translation of scientific texts. The subjective observer was removed from the picture as, possibly, a manipulator, the referential dimension of language was exalted, transparency of words became a requisite and a plainer style, without elaborate rhetorical flourishes, was adopted in order to achieve accuracy and concentrate on things, not words (Bennett 2011, 190–191). Bennett also connects the easier translatability of scientific texts to the particular grammar of scientific language, as described by Halliday and Martin (1993).

Even Hayden White, a prominent postmodern theorist of history, who might be expected to recognise literary style in texts of all kinds, distinguishes as late as 2000 between science and literature and attributes literalness to science and figuration to both literature and historiography:

> The impossibility of this ideal [of literalness] was manifested in the failure of professional historians in our own time to make of historical studies a science. The recent 'return to narrative' manifests the recognition among historians that a writing more 'literary' than 'scientific' is required for a specifically historiological treatment of historical phenomena. This means a return to metaphor, figuration, and emplotment, in place of the rule of literalness, conceptualization, and argument, as components of a properly historiographical discourse. (White 2000, 395)

Given that the literal language used to describe and impart information is thought to be easier to transfer to a different language, translation of scientific texts that are taken to employ literal language was thought to be untroubled and smooth. Walter Benjamin, for instance, thinks that, unlike literary language, informative language is possible to translate, even if badly. The transmission of information, Benjamin says, is the hallmark of bad translation because it transmits something inessential. What is essential and difficult to translate is what the literary work contains in addition to information, namely, 'the incomprehensible, the secret, the "poetic"' (Benjamin 2012, 75). In Benjamin's view, descriptive language is easy to translate but he thinks that very little is gained when this kind of translation succeeds because the information imparted is confined to what the words refer to; in contrast, literary language is rich in nuances and allusions and evocative in many respects that suffer or get lost in translation.

3. Incommensurability in Science—Kuhn's Account

In philosophy of science, before Thomas S. Kuhn's *The Structure of Scientific Revolutions*, published in 1962 (Kuhn 1970), translation featured in the writings of the logical positivists, mostly in relation to the reduction of terms and statements to a physicalist language, which, according to Rudolf Carnap, was supposed to be universal and inter-subjective

(Carnap [1932–1933] 1959, 165; cf. Hempel 1959, 116–118). In that context, translation did not seem to pose any of the problems that typically preoccupy philosophers in relation to translation (e.g. preservation of sense). Carnap, for instance, says that to reduce *a* to *b* and *c*, 'means to produce a general rule that indicates for each individual case, how a statement about *a* must be transformed in order to yield a statement about *b*, *c*' (Carnap 1967, §2; cf. §35) The aim, as part of the project of a unified science, was to construct a deductive system of concepts step-by-step from fundamental ones, in order to show that 'an intersubjective, objective world, which can be conceptually comprehended and which is identical for all observers' is possible (Carnap 1967, §2). The important thing in that process was transformation *salva veritate*, i.e. the preservation of truth value, not necessarily preservation of sense (Carnap 1967, §50–51). The translated statements were supposed to have the same truth value and this was all that mattered. A key element in the system was the ground level, that of the protocol statements, i.e. of corrigible observation statements. The truth of the protocol statements was transferred to the sentences that were constructed by means of the general rule that dictated how translation was to be conducted.

Kuhn's book introduced the concept of incommensurability[5] and highlighted problems of communication between scientists who embrace incommensurable paradigms. According to Kuhn, two scientific schools that adhere to incommensurable paradigms 'will inevitably talk through each other when debating the relative merits of their respective paradigms' (Kuhn 1970, 109). In his view, 'schools guided by different paradigms are always slightly at cross-purposes' and '[c]ommunication across the revolutionary divide is inevitably partial' (Kuhn 1970, 112, 149).

Communication breakdowns were supposed to follow from the fact that even observation statements, which served as the common ground to which different theoretical statements could be reduced, were tied to incommensurable paradigms and were, therefore, theory laden. So, mutual understanding of even the simplest possible informative or descriptive statements became impossible. What made things more difficult was that incommensurability implied different ontologies, different description of problems, different evaluative criteria.[6] So, there wasn't much left as a recourse and common ground to facilitate communication and comparative judgement. Two paradigms or conceptual schemes, even if expressed in the same natural language and even if they use the very same terms (e.g. 'mass', 'motion', 'planet', etc.), employ different concepts and form conceptual networks that cannot be mapped onto each other.

This situation was thought to be intolerable. Incommensurability, which covered concepts, standards, and precepts, was undermining the whole edifice of science: rational comparison of theories, communication of scientists and scientific progress could not be made sense of.[7] Kuhn's critics argued that if proponents of different paradigms do not share a language, then they couldn't rationally choose between them. Endorsement of a paradigm was presented as a leap in the dark (MacIntyre 1980; Rorty 2000, 63n1), as involving an emotional transformation in lieu of logical thinking (van Fraassen 2002), as a capricious preference or a matter of conversion effected not through argument but persuasion, which was understood as magical and as having nothing to do with logical judgement (e.g. Scheffler 1982, xi).[8]

Kuhn contributed to this reception of his work, since he himself used the analogies of *Gestalt* switch and conversion to elucidate what scientific revolutions involve[9] and he often talked of persuasion as opposed to what was taken to be rational argumentation.[10] He,

thus, lent support to the criticism that presented him as saying that scientific change is a matter of inexplicable, mystical change of heart.[11] If there is no common language, there is no mutual understanding. The new paradigm emerges as an absurd, incoherent, and unintelligible option to take from the perspective of the previous epistemic network (van Fraassen 2002, 72), which means that, to embrace it, non-discursive means of persuasion are needed. Bas van Fraassen (2002, 108), for instance, has suggested that emotions play that role. They transform the way scientists perceive the world and they make possible the transition from a prior to a posterior and, up to that point, unintelligible epistemic state.[12]

Particularly poignant, and relevant to the issue of translation, was the argument that blamed Kuhn for self-refutation. 'To tell us that Galileo had "incommensurable" notions and then to go on to describe them at length is totally incoherent', Hilary Putnam (1981, 115) wrote, while Donald Davidson (1984, 184) noted that 'Kuhn is brilliant at saying what things were like before the revolution using—what else?—our post-revolutionary idiom'.[13] How did Kuhn react to this kind of criticism? What role did translation play?

4. Incommensurability and Translation—Kuhn's Response to Criticism

To take care of the vehement criticism, Kuhn, in the 'Postscript' to *Structure*, pointed to the obvious and very common practice of translation. What the participants in a communication breakdown can do, he said, 'is recognize each other as members of different language communities and then become translators' (Kuhn 1970, 202). Because translation makes communication possible, defenders of incommensurable paradigms would be able to understand, compare and evaluate paradigms and theories, at least in part. By turning to translation, Kuhn hoped that the problems attributed to incommensurability would be mitigated. He would account for the obvious fact that scientists do talk to each other even at times of crisis and revolution and he would take care of the charges of utter irrationality in theory change. Scientists would listen to and entertain arguments and reasons. But Kuhn did not abdicate talk of persuasion and conversion. Conversion remained at the heart of the revolutionary process in his work (Kuhn 1970, 204). Translation was supposed to offer resources in the attempt to persuade, but persuasion could come about, Kuhn said, independently of translation. What is more, scientists could be intellectually convinced to choose one paradigm over another (via translation perhaps), but they could still be unable to embrace the translated theory as truly their own. They may even work with the new theory, Kuhn says, but they will do it as 'foreigner[s] in a foreign environment' (Kuhn 1970, 204).

Clearly, Kuhn, at the time he wrote his 'Postscript', was interested to shake off the charge that he was ignoring familiar aspects of scientific life, such as the communication of scientists advocating different paradigms. He wanted to reassure his critics that he did not stand for anything extravagant, that his point was 'long familiar in philosophy of science' (Kuhn 1970, 199). He thought, as he explained later, that his experience with Aristotle's texts was similar to that of Willard V. O. Quine's radical translator and 'tended to see translations as a way to resolve incommensurability' (Kuhn 1999, 33).

In his later writings, however, he realised that Quine's 'radical translator' was not translating 'jungle' utterances but was rather a language learner. Language learning, in Kuhn's

view, 'produces bi- or multilinguals rather than translators' (Kuhn 1999, 34) and it is quite possible that no translation can be found for particular linguistic terms, no matter how hard we try or how meandering the moves. This is where, he now says, incommensurability lies. Unlike Quine, who speaks in *Word and Object* (Quine 1960) of many equally good translations of jungle words, Kuhn thinks that no translation of foreign expressions may be adequate. So, now, instead of trying to eliminate incommensurability by way of translation to appease his critics, Kuhn claims that *incommensurability equals untranslatability* (Kuhn 1989, 11). He has even said that 'untranslatable' is a better word than 'incommensurable'. Untranslatability, which is distinguished from intelligibility, becomes the mark or symptom of incommensurability and it is not to be eliminated.

Like Ian Hacking (2002, 171), Kuhn believes that 'it is not truth value but effability that varies with language' (Kuhn 1999, 35; cf. 1993, 330). That is, a statement expressed in one language cannot be put intelligibly into words of another; it's not a candidate for taking the predicates True or False. Any effort to translate it results in strained, incomprehensible texts. Kuhn uses several examples to illustrate his point: for instance, he tries to translate statements from phlogiston theory. Some of them, he says, can be intelligibly expressed in modern chemical vocabulary but others resist translation either because terms such as 'principle' have lost all chemical significance or because terms such as 'element' have acquired additional functions. These terms express several things simultaneously in the old theory and cannot be replaced individually by some set of modern words or phrases. Any attempt to do so will result in losing connections and will not be translation proper, 'at least not in the sense of that term standard in recent philosophy' (Kuhn 2000a, 43).[14] Other examples involve the Newtonian terms 'mass', 'weight', and 'force', the Aristotelian terms 'kinesis' and 'metavole', Volta's 'battery' and 'electrical resistance', Planck's 'energy' and 'resonator'. Kuhn's conclusion is:

> the problems of translating a scientific text … are … like those of translating literature. In both cases the translator repeatedly encounters sentences that can be rendered in several alternative ways, none of which captures them completely. Difficult decisions must then be made about which aspects of the original it is most important to preserve. … The preservation of truth values when translating scientific prose is very nearly as delicate a task as the preservation of resonance and emotional tone in the translation of literature. (Kuhn 1989, 12)

These comments, he says, apply not only to the so-called theoretical statements but also 'and more significantly to those their authors took to be merely descriptive' (Kuhn 1989, 12).

So, Kuhn brought science closer to literature with respect to translation. Literature used to pose a problem for translation and, now after Kuhn's work, scientific texts face similar problems.[15] Words acquire meaning in a semantic field in both science and literature (scientific terms are not pure denotations) and the associations in one network cannot be reproduced or saved in the other.[16] In literature, content and language are thought to 'constitute a certain unity', as Benjamin (2012, 79) has put it, a unity which is difficult to preserve in translation. In the original, language and content are like 'a fruit and its skin', whereas in translation, when content is separated from language and is transplanted to a new linguistic medium, 'a translation surrounds its content, as if with the broad folds of a royal mantle' (Benjamin 2012, 79). No tight unity any more. In science, on the other hand, it was supposed that language is insignificant in comparison

to content and does not form a unity with it. Language in science was anyway thought to be transparent and, in any case, a superfluous convention, so translation, which concentrates on content, could proceed unproblematically.

In summary, the situation developed as follows. Kuhn introduced the concept of incommensurability, which his critics justifiably—given Kuhn's own remarks—took to imply severe problems of communication between scientists and problems of rationality in relation to theory choice. Originally, Kuhn objected to this criticism, saying that his work did not preclude inter-paradigmatic communication which can be achieved via the ordinary activity of translation even if 'the price is often sentences of great length and complexity' (Kuhn 1970, 203). But he, nevertheless, insisted that there couldn't be complete assimilation of one language to another. Later, instead of trying to eliminate the problems of incommensurability by way of translation, he turned the problems of translation into the markers of incommensurability. When certain areas in language resist translation, then the respective paradigms are incommensurable. No matter how hard we try, how complex we make the correspondences between words in the two networks, there will always remain ineliminable discrepancies. The two paradigms will not be congruent. Even if we try to modify one lexicon to match or accommodate the other by, for instance, enriching it with new terms, the result will be 'peculiar', as Kuhn (1989, 11, 22) put it. We should keep the added terms 'segregated', he said, to avoid inconsistencies and strained usage, and use them only for special purposes (Kuhn 1989, 11). It is like having two maps of the same area with different coordinate systems that do not exactly correspond one to the other (Kuhn 1989, 13). You cannot just add parts of the one to 'enrich' the other.[17] Kuhn said, 'Different lexicons—those of different cultures or different historical periods, for example—give access to different sets of possible worlds' (Kuhn 1989, 11), while Alasdair MacIntyre (1988, 381) pointed to the fact that assertions in one language imply certain beliefs and preclude others, which means that translating isolated words (or longer isolated phrases) will not help us get the implications of the original linguistic expressions.[18]

But how does Kuhn respond to the charge of self-refutation, to the charge, that is, that despite incommensurability and its concomitant untranslatability, he manages to convey to us very effectively by translation the beliefs of those who adhered to paradigms incommensurable to ours? What he did, he says, was to learn, with great difficulty (which also involved a conversion experience), the language of the communities that held the superseded paradigms. Having mastered the language, he then attempted with 'the greatest tact and taste' to deliver to us what he understood. This is very different from what Carnap prescribed, i.e. a general rule as to how terms and sentences should be translated. The task of translation, according to Kuhn, be it of literary or scientific texts, is very delicate and there is no unique or best approximate solution. 'In these matters there is no such thing as being merely right or wrong' (Kuhn 1989, 12). Kuhn says that we are prone to confuse two things: universal translatability on the one hand and, on the other, the assumption that 'anything which can be said in one language can, with imagination and effort, be *understood* by a speaker of another' (Kuhn 1989, 11; emphasis in the original). Kuhn thinks that we can understand (by learning the foreign language) but we may not be able to translate. There cannot be a manual, or a rule, however sophisticated, 'which specifies, as a function of context, which string in one language may, *salva veritate*, be substituted for a given string in the other' (Kuhn 1989, 11).

MacIntyre describes a similar process: when we want to understand a language, we try to immerse ourselves, as anthropologists do, in the culture which uses it, we become 'surrogate participants' in the respective communities and we come to acquire 'a second first language'. The ones who acquire two first languages are able to identify, not only what can be translated, but also what is mutually untranslatable. Then, they may try to enlarge one tradition and language by linguistic innovations (e.g. neologisms). Cicero, for instance, MacIntyre says, 'both translated from Greek and neologized Latin' and Greek before the Septuagint and without the Septuagint could not say what the Hebrew had said (MacIntyre 1988, 372). Phrase books that match sentences from two languages, even when they include context and are drafted by sophisticated hands, will not be of much help as words belong to a certain network of uses in the source language which cannot be reproduced in the target language (MacIntyre 1988, 382).[19] Translation, by way of a manual, would have difficulties capturing what MacIntyre calls the poetic use of language, namely the ability 'to go on and to go further' (MacIntyre 1988, 382), by which he means the ability to make new, and sometimes unanticipated, applications of the linguistic expressions. It seems that we again reach the conclusion that literary use does not significantly differ from any other (including the scientific) use of language.

This is not a conclusion, however, that would satisfy Kuhn's critics. They would prefer a sharp distinction between science and literature as regards translation and they would like the dramatic implications of incommensurability, most notably untranslatability, to be averted. In what follows, I will try to show that Kuhn and his critics understand things differently. His critics start from presuppositions that Kuhn does not share and claim that the thesis of incommensurability is incompatible with communication and translation. I will argue that these dramatic implications of incommensurability follow from their way of seeing things, not from Kuhn's. Kuhn's philosophy allows for communication and translation despite holding on to the incommensurability thesis.

5. Why Was It Assumed That Translation Proceeds Differently in Science and Literature and Why Was Incommensurability Thought to Be a Major Problem?

The presupposition behind the view that translation proceeds differently in science and literature is the idea that language is just a dress of thought (Johnson 2009, 415) and words conventional labels attached to fixed meanings or things (Quine called this view 'the myth of the museum': Quine 1969b, 27). In literature, and especially poetry, emphasis is given to the weaving of words and the effects each particular weaving produces, while in science the interest lies in what is outside the words, in what the words refer to and convey. Consequently, the change of words that translation requires is more significant in literature (*ergo* talk of the impossibility of translation there) than it is in science where words are seen as either superfluous, because transparent, or as unavoidable inconveniences and burdens that we should try to ignore.

The idea that words are burdens and get us entangled in all kinds of problems is very old. George Berkeley, for instance, in the introduction to his *Principles*, writes that 'most parts of knowledge have been strangely perplexed and darkened by the abuse of words'. So he pledges to take whatever ideas he considers 'bare and naked': 'so long as I confine my thoughts to my own ideas divested of words, I do not see how I can easily be mistaken …

absurd opinions and insignificant disputes, … grow out of the abuse of words' (Berkeley 1965, 19).[20] Naturally, as a follow-up, Jonathan Swift in *Gulliver's Travels* describes the project of the school of languages at Lagado of abolishing words altogether: 'since words are only names for things, it would be more convenient for all men to carry about them such things as were necessary to express a particular business they are to discourse on'.[21] The only inconvenience, Swift notes, is that 'if a man's business be very great, and of various kinds, he must be obliged, in proportion, to carry a greater bundle of things upon his back, unless he can afford one or two strong servants to attend him'. An extra advantage of this scheme, according to Swift, is that 'it would serve as a universal language, to be understood in all civilised nations, whose goods and utensils are generally of the same kind, or nearly resembling, so that their uses might easily be comprehended' (Swift 2004, 224).

The ideal of a universal language in early modern Europe is a precursor of modern scientific language. *Lingua universalis* in the seventeenth and eighteenth centuries would consist of real characters that would capture the essence of things representing them directly and non-conventionally and it would deliver 'real knowledge' which was contrasted with 'the book-knowledge and the empty wordiness of much of scholastic learning' (Knowlson 1975, 34).[22] Such a language would facilitate learning rather than be an obstacle to it. Subsequently, scientific language assumed the role of the universal language since, by drawing upon science, it would represent accurately how the world is. The furniture of the world was thought to be fixed and independent of language and we were supposed to find the concepts and terms to name and describe it. If terms happened to differ from language to language (e.g. English, French, Chinese, etc.), that would be immaterial since we could establish conventional equivalences—given the fixed and stable categories—and proceed to translate. 'To switch languages [would be] to change the labels', as Quine (1969b, 27) has put it.[23]

As long as the furniture of the world remained fixed and stable, translation of scientific texts was not thought to be a problem. Once incommensurability was introduced, however, things changed. Both conceptual and perceptual incommensurability[24] implied that conceptual networks carve the world differently and there is no common ontology, no common, pristine, observational recourse to warrant correct translation between frameworks. Translation of scientific texts becomes similar to translation of literary texts in the sense that it involves making difficult and delicate decisions that will unavoidably have problematic repercussions. If concepts are understood as having an observational core which is free of any theoretical penetration and which is accessible and common to all, then translation can proceed unobstructed, since we can always resort to the common elements that the senses provide to establish the linguistic correspondences. If even observation is theory laden, the linguistic correspondences needed for translation will not be anywhere grounded and the translators' decisions will always have an element of arbitrariness.

All these presuppositions (i.e. that language is a superfluous dress of thought, that there is a certain way the world is and words are labels for things in it, that scientific language is either transparent or a substitute for ideal language, that concepts are well-circumscribed entities with a core observational content, uncontaminated by theory, common to all) were challenged by Kuhn's approach.

6. Kuhn's Different Approach

Kuhn declared himself an 'unregenerate Whorfian' (Kuhn 1999, 34), meaning that he was in agreement with Benjamin Lee Whorf's view that the world is disclosed through language.[25] He repeatedly claimed that in language learning what is acquired is knowledge of language and of the world together (Kuhn 2000a, 31; cf. 1977, 302n). When we learn to use certain terms, such as 'table', 'chair', 'liberty', 'energy', 'cell', etc., we do not just learn to apply labels to things. We certainly learn what the words for various things are but we also learn what these things are.[26] According to Kuhn, 'Knowledge of nature is embedded and projected from language. Two languages are incommensurable in just those areas where they project nature in incompatible ways' (Kuhn 1999, 34).

Obviously, for Kuhn, language is not the dress of thought, nor are words labels for already given objects. We learn how to employ words in particular circumstances and in doing so we come to know the world, what entities it includes and what they are like. In scientific education we are trained to see the world through the glasses of our scientific theories which, once changed, give us access to a different worldview. Kuhn's comments in *Structure* that 'we may want to say that after a revolution scientists are responding to a different world' and that 'the proponents of competing paradigms practice their trades in different worlds' (Kuhn 1970, 111, 148), have provoked harsh criticism, charges of constructivism, idealism, and relativism. They led critics such as Carl G. Hempel (1980, 197) to ask 'How can [adherents of different paradigms] ever have lunch together and discuss each other's views?'.[27] Clearly Kuhn's critics demanded a common, unchanging, ontological or observational basis that would survive theory change and would make communication and translation possible. In the absence of such a stable and shared platform we would be left adrift in the open seas of uncertainty, of misunderstanding and arbitrariness. This is the reason that they adhered to the view that there is an observational core in concepts that would remain stable despite paradigm change.

A common ground becomes a requirement for communication and translation only if one understands concepts as ring-fenced islets and paradigms as isolated island empires (Galison 1995). In this case understanding and communication depend on sharing common elements of concepts and paradigms. If the common elements are lacking due to the diagnosis of incommensurability, the aforementioned dramatic consequences follow. But Kuhn did not have such a view of concepts. He was influenced by Ludwig Wittgenstein's philosophy and understood concepts more as Wittgenstein did, namely, as open-ended and flexible, comprising a long series of applications of words on the model offered by paradigms.[28] Every new application covers new ground and transfers the word and concept into new territories and situations (cf. Cavell 1979, 190). With every new judgement, there is a transition, a 'gradual sloping of concepts' (Wittgenstein 1982, §765). If we understand concepts like this, then the translation of words can be seen as another attempt to extend the concept, to make a new application and establish new connections, this time with words in another language.[29] Instead of thinking of a kernel of meaning that simply changes garb when transferred intact from one language to another, fitting neatly into the new lexical environment, we can think of translation as the attempt 'to do the same' with foreign words, that is achieve the same results by reproducing the connections of the source language into the target one. By so doing,

however, we move ahead (as we also do with the normal expansion of word use), we find and nest our concept into new sets of relations and bend it in a new direction. Lawrence Venuti (2000, 470–472), a theorist of translation, considers a similar process. Communication in translation, Venuti says, has been defined as the 'transmission of an invariant'. But the invariant has to be established first, which means that the message to be communicated has to 'interpreted and reinvented'. According to Venuti, translation varies meaning and what we have are lexical shifts.[30]

So, if concepts are understood as uses of words in a variety of applications, incommensurability loses its bite—i.e. its dramatic consequences—since every new application of a word in a practice of use differs somewhat from others. The differences between languages of different periods or of different cultures may remain deep and irreconcilable but they would not be accounted for in terms of magnitudes lacking a common measure, as it is required in mathematics. We would not have well-circumscribed entities—the concepts—to compare and check for a remainder.[31] The networks to which the concepts belong may still be incongruent, i.e. incommensurable, but it would not make sense any more to speak of the impossibility of translation. The impossibility of translation between incommensurable languages followed, in principle, from the elimination of any common element between concepts. With the Kuhnian understanding of concepts, which takes them to be open and flexible and splintered into various uses, there would definitely be difficulties to establish equivalences and make connections between languages, but there wouldn't be any principled obstacle to the task of translation. Translation would become a problem to be solved. Wittgenstein in *Zettel* put it as follows:

> Translating from one language into another is a mathematical task, and the translation of a lyrical poem, for example, into a foreign language is quite analogous to a mathematical *problem*. For one may well frame the problem 'How is this joke (e.g.) to be translated (i.e. replaced) by a joke in the other language?' and this problem can be solved; but there was no systematic method of solving it. (Wittgenstein 1970, §698)

We have come back to the common treatment of science and literature, even poetry. We can translate any kind of text but not by using a manual or a general rule that make systematic correlations. We need to become bilingual, that is, fluent in the use of words in as great as possible variety of contexts so as to be able to find the most sensitive solutions in our attempt to match networks.

Quine thought, 'It makes no real difference that the linguist will turn bilingual and come to think as the natives do—whatever that means' (Quine 1969a, 5). Even if one knows two languages, one still needs to translate, that is, one still needs 'to transfer the invariant' in the terminology we used before. And if we cannot know what the invariant is, as Quine thought, or if there is no invariant because of incommensurability as Kuhn thought, we cannot have translation. The approach I am proposing, however, does not face this problem since it does not speak in terms of transferring an invariant given that it accepts the incommensurability thesis, and proposes a different understanding of concepts. What it says is that if we are fluent speakers of the two languages we want to translate, we can always try to find a satisfactory solution to the problem as we will define it. This approach differs from a typical response to incommensurability by critics who deny that such a phenomenon (i.e. incommensurability) exists. They argue that we can always find ways to translate, even if in a roundabout way and, therefore, there is

no incommensurability (which they understand as impossibility of translation). This response is offered, and ought to be understood, as a compromise. Critics acknowledge that we may be uncertain as to the exact equivalences of meaning or reference when we translate from one language into another, but they insist that we can still achieve good approximations. The approach that I am proposing, however, does not see translation as the attempt to approximate a common element, be that the meaning of words or reference. There is no such common element if incommensurability is assumed, and so there is no point in talking about approximation. My proposal sees translation as an attempt to correlate incongruous uses of words in two different linguistic networks. This task requires knowledge of the two languages, sensitivity in making choices and responsibility for the choices made. It is not a compromise, a second best solution, vis-à-vis an ultimate success. It is the only option available.

7. Conclusion

The introduction of incommensurability showed us that scientific language and literary language do not significantly differ as regards their amenability to translation. The reason is not, as critics thought, that incommensurability made translation for science as impossible (or imperfect) as it is for literature. What incommensurability did, was to undermine the idea that in science, unlike what is thought to be going on in literature, there is a language-independent, common element that is preserved and transferred during translation from one language to another. But, questioning this common element, did not bar the practice of finding equivalences between languages. Once we frame a translation problem to be solved, we can find ways to solve it, despite the grave differences that the languages under translation may have. There may be alternatives to the solutions given but the possibility and correctness of translation does not depend on finding an independent arbiter in the form of extra-linguistic content.

Notes

1. Friedrich cites St. Jerome who, like a Roman emperor, declares: 'The translator considers thought content a prisoner (*quasi captivos sensus*) which he transplants into his own language with the prerogative of a conqueror (*iure victoris*)' (Friedrich 1992, 12–13).
2. In translation studies and history of science there is renewed interest in the practice of translation focusing on various cultural aspects and questions such as, who translates, what is translated, for whom and for what purpose are the translations made, etc. For more on cultural translation see Burke and Po-Chia Hsia (2007). On translation and science see Sarrukai (2002) and the articles in the special issue of *The Translator* (Olohan and Salama-Carr 2011), the special issue of *Annals of Science* (Dietz 2016), and the Focus section of *Isis* (Dupré 2018).
3. See, for instance, Cleanth Brooks (1960, 214): 'One must put himself at the mercy of the translator—with the knowledge that the finer aspects of poetry elude translation'. Brooks also contends that, according to the American philosopher W. M. Urban, a poem 'is strictly untranslatable: what it "says" can be rendered only by the poem itself' (Brooks 1960, 232).
4. Paz wrote, 'The meanings of a poem are multiple and changeable; the words of that poem are unique and irreplaceable'. Paz also spoke of 'the fixed language of the poem' which is 'congealed and yet living' (Paz 1992, 159).
5. The term 'incommensurability' was simultaneously and independently introduced also by Paul K. Feyerabend in his seminal paper, 'Explanation, Reduction, and Empiricism' (Feyerabend 1962). On Feyerabend's understanding of incommensurability, which differed from

Kuhn's, see Oberheim (2005). On Kuhn, Feyerabend, and incommensurability, see Hoyningen-Huene (2004).

6. For a detailed discussion of Kuhn's early account of incommensurability, see Hoyningen-Huene (1990, 1993); Sankey (1993). On Kuhn's later conception of taxonomic incommensurability, see Sankey (1998). In the present section, and in the present article, I am not giving a full account of Kuhn's views on incommensurability but focusing only on those aspects that pertain to translation.
7. On the occasion of *Structure*'s 50th anniversary, David Weinberger (2012) put it succinctly: 'The scientists hated incommensurability because it seemed to imply that science makes no real progress, the philosophers hated it because it seemed to imply that there is no truth, and the positivists hated it because it seemed to imply that science is based on nonrational decisions'.
8. Referring to Kuhn's account of science, Israel Scheffler also comments: 'The general conclusion to which we appear to be driven is that adoption of a new scientific theory is an intuitive or mystical affair, a matter for psychological description rather than logical or methodological codification' (Scheffler 1982, 18).
9. 'Just because it is a transition between incommensurables, the transition between competing paradigms cannot be made a step at a time, forced by logic and neutral experience. Like the gestalt switch, it must occur all at once (though not necessarily in an instant) or not at all'; 'The transfer of allegiance from paradigm to paradigm is a conversion experience that cannot be forced' (Kuhn 1970, 150, 151).
10. Although Kuhn speaks repeatedly of 'persuasive arguments' (e.g. Kuhn 1970, 159), he often contrasts logical proof and persuasion. '[T]he the status of the circular argument [arguing in defence of a paradigm by premising the same paradigm] is only that of persuasion. It cannot be made logically or even probabilistically compelling for those who refuse to step into the circle'; '[T]he superiority of one theory to another is something that cannot be proved in the debate. Instead, I have insisted, each party must try, by persuasion, to convert the other' (Kuhn 1970, 94, 198).
11. Kuhn was not, of course, unaware of the fact that scientists who, as he says, are 'reasonable men' (Kuhn 1970, 158), use and hear arguments in the debate over the merits and defects of paradigms (cf. Kuhn 1970, 152, 155). What he contends is that the superiority of the new paradigm over the old cannot be shown by a step by step logical inference which resembles a logical or mathematical proof that rests on shared premises and agreed upon rules. Rather, in his view, the reasons used function as values that are applied differently by different individual scientists (Kuhn 1970, 199).
12. See Kindi (2011) for a discussion and criticism of van Fraassen's idea.
13. In the opposite direction, Paul de Man (1984), talking about Walter Benjamin's article, 'The Task of the Translator', translated by Harry Zohn (Benjamin 1969), makes the paradoxical claim that the English and French translations of Benjamin's text, which defends the view that it is impossible to translate, instead of refuting this view, confirm it. He goes on to point out the grave misunderstandings of these two translations of the German original, translations which were penned by eminent scholars and experts of the German language. The claim he makes is not that these two translations just happened to fail but the oxymoron that, although these are translations of the particular text, they were bound to fail as translations.
14. The sense that Kuhn alluded to must have been the one that Carnap had proposed, namely, the formulation of rules that would guide translation.
15. Kuhn notes that he does not want to eliminate the difference between literal and figurative use of language. His point, he says, 'is simply that the literal and the figurative use of terms are alike in their dependence on preestablished associations between words' (Kuhn 1989, 12).
16. Paul de Man gives the example of the German word *Brot* and the French word *pain*. Both mean the English 'bread', but *Brot* in the context of Hölderlin brings to mind, according to De Man, Hölderlin's text *Brot und Wein* which is certainly not the case with the

French *pain*. *Pain* is associated with '*pain français*, *baguette*, *ficelle*, *bâtard*, all those things' (de Man 1984, 87). *Pain et vin* brings to mind, he says, what you get for free in a cheap restaurant.

17. 'Except under very special circumstance, like those of the historian at work, the price of combining [two incommensurable lexicons] is incoherence in the description of phenomena to which either one might alone have been applied. Even the historian avoids incoherence only by being sure at all times which lexicon he is using and why. Under these circumstances, one may reasonably ask whether the term "enriched" quite applies to the enlarged lexicon formed by the combination of this sort' (Kuhn 1989, 22).
18. MacIntyre gives the example of translating Horace's Latin into Hebrew. What Horace said about gods 'could only have emerged in Hebrew as at once false and blasphemous; the Hebrew explanation of the Roman conception of a god could only have been in terms of an idolatrous regard for evil spirits. It is in the course of just this type of explanation that "daimōn" is transformed into "demon".' (MacIntyre 1988, 380).
19. Cf. Quine (1969a, 3): 'What we want from the linguist as a serviceable finished product, after all, is no mere list of sentence-to-sentence equivalences, like the airline throwaways of useful Spanish phrases. We want a manual of instructions for custom-building a native sentence to roughly the purpose of any newly composed English sentence, within reason and vice versa'. Neither Kuhn nor MacIntyre would believe that such a manual could ever be constructed.
20. Cf. Bacon (2000): 'Plainly words do violence to the understanding, and confuse everything; and betray men into countless empty disputes and fictions' (Aphorism 43); 'But the *idols of the marketplace* [the illusions imposed on the understanding by words] are the biggest nuisance of all … ' (Aphorism 59). Similar comments can also be found in other writers of the period, such as Boyle and Leibniz. See Rossi (2000), chs. 7 and 8.
21. Cf. Bacon (2000, 225): 'State all the things you accept briefly and summarily, so that there may be no more words than there are things'.
22. On the efforts to construct a universal language in seventeenth-century England and the relation of such a language to scientific terminology see Salmon (1988, 129–206). Cf. Halliday and Martin (1993, 6).
23. One of the referees of this paper objected that the early modern view that words are burdens can hardly be attributed to the pre-Kuhnian philosophy of science of the twentieth century since it did not embrace a realist conception of the world, but rather assumed an anti-realist or instrumentalist perspective. It is true that the logical positivists, who dominated philosophy of science in the first half of the twentieth century and helped philosophy take the linguistic turn, did not care about ontology and focused on the linguistic expressions of science. But the language they studied was not the rich and dynamic language that scientists actually use but a metaphysically neutral formal language. They dealt with a pure calculus of uninterpreted symbols that were manipulated 'according to preassigned formation and transformation rules' (Feigl 1970, 5). Words in this context are signs that lack any substantive content that would pose a problem for translation. As Feigl put it, expressing more generally the spirit of the logical positivists, 'their "meanings" are, if one can speak of meanings here at all, purely formal' (Feigl 1970, 5). In both cases, i.e. in early modern times, and in philosophy of science before Kuhn, words in actual use meant trouble for philosophy. That is why in both cases, they were set aside and the effort was to substitute an ideal language (formal or not) for the actual one.
24. The terms 'conceptual' and 'perceptual incommensurability' were introduced by Hoyningen-Huene and Sankey (2001).
25. On the relation between Kuhn and Whorf see Irzik and Grünberg (1998).
26. We find the same thought in Stanley Cavell's *The Claim of Reason*: 'In "learning language" you learn not merely what the names of things are, but what a name is; not merely what the form of expression is for expressing a wish, but what expressing a wish is; not merely what the word for "father" is but what a father is' (Cavell 1979, 177). Kuhn and Cavell influenced each other when they were both at Berkeley. For more on the relation between Kuhn and Cavell see Kindi (2010).

27. Hacking (1975, 115) called similar questions 'stupid'. Kuhn was concerned that, in works that followed historical philosophy of science, nature may have lost its part in the theories we built about it (Kuhn 2000b, 120). He, nevertheless, insisted that 'the supposedly solid facts of observations turned out to be pliable … the so-called facts proved never to be mere facts, independent of existing belief and theory' (Kuhn 2000b, 108).
28. See Kindi (2010, 2012a, 2012b). Wittgenstein (1988, 50) says that 'a concept is the technique of using a word'. Hacking (1990, 359) followed Wittgenstein in assuming that concepts are 'uses of words in their sites'.
29. A similar understanding of translation is found in the Middle Ages. The word *translatio* meant 'displacement' or 'transfer' and appeared in expressions such as *translatio studii* and *translatio imperii*, which mean transfer of culture or government from one epoch to another or from one place to another (Cassin 2014, 1146).
30. Venuti discusses an English translation of Antonio Tambucchi's Italian novel, *Sostiene Pereira*, to show how the choices made by the translator (incorporating both British and American slang) may invoke associations with works and styles in the English language not available in the original.
31. '"Incommensurable" means that you are always confronted with a remainder' (James 1996, 62).

Acknowledgements

I would like to thank J. W. McAllister, editor of this journal, and the three referees for their valuable comments and criticism, which helped me improve the manuscript considerably.

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