Induction and reason: The hull of Neurath's ship

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Abstract

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This article is about induction and justification. It explores some epistemological consequences of the impossibility of justifying inductive practices without resorting to induction. Granted this impossibility, the notion of justification has to be reconsidered. If we don't want to give up concerns with justifying our knowledge endeavours, we have to consider the connections between reason and nature on the light of the fact that inductive success depends on argument and support but also on matters of fact.

The reconsideration of the connections between reason and nature is done in this article from the epistemological landscapes that open up from a critique of empiricism. Empiricism provided a framework to think of justification as (at least partially) grounded on empirical content. If we give up the idea that we can isolate the empirical content of our thoughts from our justification practices, we wonder how reason can make contact with the world that is meant to justify at least some of our thoughts. I shall argue that induction, in many senses, bridges the gaps between natural causes and the space of arguments.

1 Epistemology without empiricism

Empiricism implies that empirical knowledge can have its justifications traced back to observations and therefore a 'from below' construction grounds knowledge on sensorial information. Empirical content is considered as a raw material for justification, the basis on which knowledge has to eventually rely. Logical empiricism endeavoured to analyse all the links between justification and empirical content to logical links. As a consequence, the whole of our knowledge could be either translated [2] or confirmed [11] to a basis of observational reports, conceived as mere statements of the received

observations, *konstatierungen*. These reports would compose a set of statements in the language, that make use of a pure observational vocabulary. The relation between empirical contents and the body of our knowledge of the world could then be expressed in terms of the connections between these reports and our theories.

In the past half century, challenges to empiricism were always more or less tied to the decline of logical empiricism as a main structured position in epistemology. Quine criticised the idea of an observational vocabulary as a special part of language that receives its meaning directly from our sensorial connections to the world. One of the central target of his critique was the verificationist idea that it is possible to establish semantic connections between particular sentences and a well defined class of sensorial experiences. Quine identified an unjustifiable dogma in the way empiricists assumed that the sensorial meaning of a statement could be isolated from other statements. He diagnosed this dogma partly as a consequence of the other dogma: that support for a statement can come from a meaning connection with other, observational statements. Meaning, and the circle of terms around it — analyticity, synonymity, definition — cannot justifiably express anything beyond sameness of reference. Denouncing these two dogmas, Quine blocks the individual paths that could support a given statement in a system of the world from a well defined set of sensorial experiences. The last paragraphs of [14] point towards a holism whereby nothing less than a whole system of the world could be supported by experience [1]. Quine targeted the possibility of making sense, within a general empiricist framework, of *a priori* connections between statements expressed in terms of meaning correlations. Although, for Quine, knowledge is supported by experience, no individual statement can be supported by experience in isolation from others.

According to Quine, experience is therefore not directly expressed in a special vocabulary. As a consequence, a theory could be retrieved from clashes with experience by changing its way of describing experience as there is an indefinite number of different ways to describe experience [2]. Quine's criticism of the idea of an observational vocabulary was the inspiration for most of the criticisms of the distinction between observational and theoretical terms. In our terms, it amounts to disconnecting the basic vocabulary

[1] More recently, Quine has been trying to back down from the assertion that only a complete system of the world is semantically enough to receive support from experience. He's now talking about smaller semantical groups of statements [16, 17].

[2] Some of these ways can turn out to be empirically and logically equivalent, as considered above.

of science from immediate observations [3].

Quine still wants to consider inductively generated science as empirical in a strong sense. Within a theory, science tends to make room for recalcitrant experience while preserving the statements that are taken to be closer to experience, and this is what makes it empirical. But, in Quine, experience still has a place beyond the conceptual raw material of induced theories. To replace the observational vocabulary, Quine appeals to the behavioural connections between languages and theories on the one hand and environment on the other hand. Experience is therefore kept as a sphere beyond concepts and connected to them by (pre-conceptual) behavioral links. Quine's notion of experience, therefore, doesn't appeal to sense data or mental sensibilia but rather to a more naturalistic talk about stimuli in nerve endings. Science is the endeavour of producing a system of the world out of the (non-conceptual) inputs to the nerve endings. In [17], he compares his naturalist project with Carnap's *Aufbau* [2] only to state that his goal is to reconstruct science with the help of science itself and on a physicalistic setting. He says:

> *[Carnap's] ground elements were his elementary experiences; each was the subject's total sensory experience during some moment, or specious present. What can we take as the physical analogue? Simply the class of all sensory receptors that were triggered at that moment; or, better, the temporally ordered class of receptors triggered during that specious present.* pp. 16-17.

Quine's empiricism is in one sense minimal and in another sense radical. It is radical because it is eliminativist about *a priori* judgements, even disguised in semantic terms such as 'conventional truths' or 'modes of speech'. Wedded to a radical epistemological naturalism [4], his empiricism recognises nothing but *a posteriori* argumentation. On the other hand, it is a minimal empiricism because the split between what is received through the sensorial apparatus and what is constructed from it is taken to belong outside the conceptual sphere. Quine's conception of empirical information relies on his behaviourism about learning to use observation sentences. Working on the distinction between reception and perception, Quine [15] describes reception as a causal process whereby the sensory nerves are stimulated from outside. Then he conceives of perception as being accessible to behavioural criteria.

[3] See [19] for an exposition of the linguistic nature of the logical empiricist approach to justification and its problems.

[4] I understand a radical naturalist as somebody that holds that every task of epistemology can be carried out by scientific enterprises, see [8].

This is the touchstone of his minimal empiricism, for perception can take place without appeal to any concept, empirical content is characterisable in terms of assent to observation sentences. There is therefore no commitment to anything that is received being immediately conceptual but there is still reception with an empirical content. Clearly, Quine's empiricism still makes room for empirical foundations of knowledge as systems of the world are supported by observations outside them that work as causal starting points for the inductive work [5].

Subsequent challenges to empiricism have shown that Quine's empiricism is still too much empiricism. Moreover, it left empiricism without tools to deal with the justification links between sensorial inputs and our hypotheses about the world [6]. Davidson [3] has drawn attention to a third dogma of traditional empiricism, the dogma that asserts that we can isolate, when talking about the justification of a set of beliefs, its empirical content. Sellars and Davidson can be seen as taking a Kantian stance towards empiricism [7].

Sellars's [18] challenge to empiricism can in many respect be compared to Davidson's as he accuses the empiricist to fall into the myth of the given, the unwarranted belief that non-conceptual empirical content can be used as a justifier. Sellars sees an inconsistency in the kernel of traditional empiricist approaches to what is given by the world through experience. The idea that sensations yield knowledge assumes that one could learn the statement that "ϕ is red" without mastering the knowledge of red and only through a sensation. The empiricist assumes that

1. Sense contents can be sensed through a non-acquired ability;

2. This ability entails non-inferential knowledge;

[5] I believe that Susan Haack's [9] bizarrely labelled "foundherentism" expresses a position very close to what Quine's empiricism entails. Haack replaces the foundationalist image of an edifice with the image of a crossword puzzle where internal constraints meet external requirements at any point — these requirements being experience. Knowledge, as the completion of a crossword puzzle, depends on experience (the clues) as well as on other beliefs (spaces already filled). Quine's position, as well as Haack's double aspect approach to beliefs as contents and states, is a minimal empiricism because it still sees causes as playing a role in justification through experience.

[6] Refer to the Afterword part 1 of [10], pages 129-137 for a brief but compelling criticism of Quine's talk on the "tribunal of experience".

[7] In the twentieth century epistemological tradition, it is common to oppose empiricism à la Hume to Kantism, although this is surely not the only way to carve the epistemological positions. [1], on the contrary, sees Kant as a moderate empiricist together with Hume and the logical empiricists. He opposes empiricism to pre-Kantian rationalism.

3. No subsumption of particulars under universals can be known through a non-acquired ability (what is often called nominalism).

Sellars points out that the claim that knowledge can be generated by non-conceptualised awareness of what is received through sense data flies in the face of nominalism. In fact, he diagnoses an inconsistent triad in 1-2-3 above where no single two statements can be reconciled with a third. Observational reports, he argues, require a reporter that is trained to use the public language and is ready to convert her observations into concepts that could be used to build knowledge.

The role of a reporter is an active and inductive role, according to Sellars. The reporter has to be accepted as able to endorse a statement concerning observation. In order for her to be held responsible for her reports, she has to had undergone a process of learning correlations between the an observational statement and the correct situations for its employment. The reporting ability is an acquired one, and the acquisition is done through inductive learning of a language. No unacquired ability to sense can yield knowledge if we are not ready to give up nominalism. In fact, we cannot state anything about what we sense without a conceptual filter that describes it while placing it in a logical space of reasons. Sense data, or Quine's nerve ending stimuli, are used by empiricists as an attempt to find justifiers beyond the sphere of the conceptual. Sellars argues that those items cannot act as the sole justifiers for observational reports, let alone act as foundations of human knowledge. The inputs to the senses can play a causal role in the development of our beliefs but this doesn't make them the sole justifiers of observational reports because they cannot be logically prior to the reports — they require a reporter to be a reporter. As Sellars stresses [8], nevertheless, they can be causally prior.

Sellars main opponent is the foundationalist empiricist that beliefs that some bits of non-inferential knowledge could be given from the sensorial apparatus and establish a ground for further knowledge. This non-conceptual given could be compared to a *noumena* that could play no justification role. Sellars intends to press a view of knowledge as interacting with experience in more than one foundational way. He [18] considers that the picture of foundations is misleading because it

> *keeps us from seeing that if there is a logical dimension in which other empirical propositions rest on observation reports, there is*

[8] See for instance [18] pages 34-37 and pages 94-98 where the doctrine of the sensorial vocabulary as theoretical vocabulary is developed.

> *another dimension in which the latter rest on the former.* ***Above all****, the picture is misleading because of its static character. One seems forced to choose between the picture of an elephant which rests on a tortoise (What supports the tortoise?) and the picture of a great Hegelian serpent of knowledge with its tail in its mouth (Where does it begin?). Neither will do. For empirical knowledge, like its sophisticated extension, science, is rational, not because it has a foundation but because it is a self-correcting enterprise which can put any claim in jeopardy, though not* ***all*** *at once.* pp. 78-79.

The view that emerges from Sellars's critique of empiricism is that knowledge is an enterprise carried on mainly through inductions that require always concepts of a public language. Human cognition involves a shared world view that is transmitted through a public language and the inductive processes of commonsense and science happen within this context. Language expresses and implements our criteria of justification. A public language, and its repository of concepts, is a tool for acquiring inductive knowledge and, in Sellars picture, has to be learned together with a class of useful inductive strategies. Concepts in language bring normativity to the knowledge process as they are the building block of reason. Reason, as we shall see below, imposes norms over cognitive processes and therefore make them revisable beyond adaptation.

Sellars, however, sees the current concepts and representations of the commonsensical picture of the world, referred by him as the **manifest image**, not as an unrevisable embodiment of reason itself. As the quote above indicate, empirical knowledge can revise any of its elements. As better learning strategies and representational devices are discovered by science, they replace the folk terms of the manifest image, replacing it by a **scientific image**. Sellars thinks of scientific induction as superseding the ordinary theoretical terms in their ability to keep the knowledge enterprise in tune with experience.

2 Reason among cognitive instincts

Quine's minimal empiricism pictured knowledge as a conceptual web that attempts to make justice to nerve ending stimuli. These stimuli provides meaning and evidence for the web. This extra-conceptual ground is what falls into the myth of the given. An epistemologist that renounces the myth

can still agree that sensorial information plays a causal role in empirical knowledge, but they have to put epistemological issues aside. If the claim that the senses play a causal role in knowledge still entails an empiricism, it is only a pallid one. Davidson [5] describes the difference between a minimal and a pallid empiricism by saying:

> *The difference lies in the choice of an epistemological stance. The approaches differ in how we interpret what Quine calls the 'two cardinal tenets of empiricism'. These are [...] that 'whatever evidence there is for science is sensory evidence ...and that all inculcation of meanings of words must rest ultimately on sensory evidence'. The sense in which these tenets are true, I am urging, is one that supports only what I [...] named pallid version of empiricism; it comes to no more than the factual claim that the sense organs are causally essential to empirical knowledge. It seems to me this is not an epistemological thesis that sets empiricism apart from those who hold other views on the nature of knowledge.* p. 76.

According to Davidson, Quine takes sides with Dummett in associating meaning to evidence rather than to truth. Davidson sees no reason to associate evidence with nerve firing for this is not enough to specify meanings if we don't already possess the (conceptual) notions of truth and a system of the world. Davidson argues that the interpreter plays an active role in the meaning ascription and therefore interpretation is part of the truth-production endeavour. For Davidson, truth, and not sensorial evidence, is the drive of our systems of beliefs, as beliefs are in their nature veridical [3]. The only ways to specify the sensorial grounding of the web of belief would have to rely on concepts and our theories about how, in the external world, the various stimuli that our nerve endings receive are connected.

A non-empiricist epistemology is based on the claim that no non-conceptual evidence is epistemological prior to our beliefs. Beliefs, already conceptual entities, are the building blocks of the epistemic structure of justifications. This distinction between epistemic structures that deals in beliefs and a causal world that they attempt to learn poses the question of how justifications relate to causes. The naturalist is inclined to consider justifications within the framework of causes. The proper way of studying justifications would therefore be to look for laws[9].

[9] Although the common view on laws and causes has that there are laws that are not causal and causes that are not expressed in laws, I shall in general and for simplicity only

Quine's plea for naturalisation in epistemology, wedded to his minimal empiricism, advocates a continuity between the external world and our beliefs through the stimuli that crosses our nerve endings. It is as if our nerve endings were part of a causal picture that contains both our cognitive machinery and the world it attempts to learn. There is a causal chain that links events that we know to the justifications we hold for this knowledge through the evidence of our nerve stimuli. Quine's empiricism makes no room for *a priori* knowledge of epistemic norms as our system of the world as a whole hinges on the stimuli that supports it. The naturalist view is one where our beliefs are to be approached with the same lenses that we approach any other part of the world. The naturalist intends to show that there is no *sui generis* space of justifications that cannot be approached with a scientific toolbox. Justifications belong to a realm of laws. This is what McDowell [10] labelled 'bald naturalism', a programme that aims to reconstruct

> *the structure of the logical space of reasons in terms that belong in the logical space of natural-scientific understanding* p. xxii

The wedding of naturalism and empiricism is a natural option for the Quinean blend of the latter. A radical naturalism, that Quine sometimes seems to recommend (see introduction or [8]), claims that there is no room for epistemology outside science as epistemology cannot be but part of the torrential output that we produce from our nervous stimuli. Quine bases his account of language learning on the same notion of nerve stimuli that grounds his minimal, naturalised empiricism [17]. If we reject Quine's empiricism, we will have to reject Quine's naturalistic account of the acquisition of reasoning capabilities through language. The naturalist, in general, feels comfortable with the bald naturalist claim that the epistemic real is not *sui generis*. Of course, a traditional, pre-Quinean empiricist doesn't feel compelled towards naturalism with all its skeptical risks[10]. Such a foundationalist empiricist can consider observations as a part of the causal realm that is given as a ground for justification. Epistemology can keep its traditional *a priori* status; observational statements become evidence on the light of norms for building hypotheses.

However, more difficult is to reconcile a radical naturalism to a rejection of the basic tenets of empiricism. The rejection of empiricism entailed by

use 'lawlike' and 'causal' and derivatives thereafter as interchangeable phrases.

[10]One can see Susan Haack's foundherentism [9] as an attempt to build epistemology in a non radical naturalist way from the Quinean empiricist viewpoint.

the rejection of raw observations as given to the justification procedures, leave concepts and reasons disconnected from causal processes that generate observations. Once justifications are moved away from the causal ground that empiricism provides, one can wonder where is their place given a causal description of cognitive activities. In fact, the dismissal of empiricism as a certainty of epistemology brought back a tendency towards a robust notion of reason, as we shall see below. One could press on the programme of reconstructing reasons in terms akin to causes and understand justification purely in terms of reliable processes[11]. Such a view, however, has to be committed to dissolving the need for a spontaneous capacity of judging, balancing and assessing arguments; a capacity that can be held responsible for its conclusions. It would instead portrait reason as a cognitive machinery that obeys causal mechanisms; a naturalist conjecture would be that reason could be understood solely in terms of inductive propensities.

This approach, call it naturalism about reason, is often accused to be at odds with a robust conception of our justification faculties. It is said that naturalisation can only be achieved through a redefinition game whereby reason is taken to be whatever fits in the naturalistic image of cognition or nature to be whatever can explain our justification seeking procedures[12]. I shall call a robust conception of reason one that involves the following three related features. First, it should be about **norms of justification** and therefore about what is correct, as opposed to the evolutionary beneficial, the computationally sound or the neurologically plausible. The naturalist attempts to explicate correctness in causal or nomic terms has to face the objection that reason is always distinguishable from any of its (natural) implementations: norms can be instantiated by contingent mechanisms of nature at a given time and space but can always be distinguished from them. Second, reason is the **realm of the revisable** and therefore it is

[11]The view of a justified belief as a reliably generated one is common among radical naturalists. The kernel of the view is that justification could be external to the subject of knowledge and therefore there is no need for a subject with a reason in the centre of a knowledge process. Something can be justified when the person (or infant or animal) doesn't have a justification In other words, justifications can exist independently of one's knowledge of them. One can suspect that such a view on justification cannot do more than delegate the justification work to someone that observes the knowledge process and is able to assess arguments, balance evidence and judge conclusions. Reliability accounts of justification seem, from this point of view, to be incomplete unless all epistemic norms could be seen as laws [6].

[12][13] has a critique of the most popular ways of eliminating reason or replacing the notion by naturalist substitutes.

often said to be spontaneous and not determined by anything else. Reason is then said to be the space of doubt and therefore connected to burdens and responsibility; it is responsible for its conclusions. Third, reason, to a great extent as a consequence of the first two features, is said to work in a **non-law-like manner** and not to be describable by any class of nomic statements.

3 Reason and justifications

Empiricism is classically constructed as a form of foundationalism. Observations provide the foundations, and therefore every act of justification is fuelled by experience. These foundations give content to the justifications and is often seen as the contribution of the world outside reason to the task of justifying beliefs. There are as many types of empiricism as there are types of foundationalism, depending on the nature of the foundations and on the relation between these foundations and the edifice of empirical knowledge. Surely, foundationalism can be non-empiricist and therefore could still provide a way to think of the structure of justifications.

The classical form of non-empiricist foundationalism is rationalism. Instead of observations, some principles of reasoning are the foundations of knowledge and are known *a priori* through pure rational insight, *intelectuelle Anschauung*. Rationalism maintains that only through *a priori* insight one can account for the principles of deduction practice and for rationality in general. Reason itself, and its capacity to grasp some principles, is seen as the source of foundation. Rationalism, unpopular since Kant's first Critique, has been recently defended by Bonjour [1]. He puts forward a moderate rationalism that advocates *a priori* knowledge achieved through rational insight as self-evident though fallible. Reflection is the ultimate source of justification fuel but further reflection can always undermine the conclusions established earlier. Insight is immediate but is corrigible by experience, although this correction has to rely ultimately in another *a priori* claim. Bonjour considers possible that

> *there are cases where an experiential challenge to a particular a priori claim requires only the support of other a priori premises that are entirely unproblematic and that may be, in the context in question, taken for granted. [...] the ultimate outcome of such a case depends primarily on a choice between two conflicting a*

> *priori claims, with experience serving only to create the conflict but playing no real role in resolving it.* [1] p. 124

A foundation can be revised by further knowledge but the drive of this process has to be an *a priori* known claim. Rational insight is taken to be the basis of reasoning and the ground of knowledge and in fact, he makes a clear commitment to foundationalism as he rejects that coherence in itself could override considerations based on insight. Rationalism, he insists, has to be essentially foundationalist(see p. 118).

Bonjour's moderate rationalism has a clear picture of reason. Rational insights provide norms to develop and assess arguments. Reason is the faculty responsible for the insights that, in their turn, guarantee the justification of our beliefs. Rationality depends only on the insight of norms and principles. His account of rational insight as foundation encourages Bonjour to venture an *a priori* justification of inductive processes(see op. cit. chapter 7). He considers that such justification could be provided without resource to deduction and despite the non-contradictory status of unsuccessful inductions. Bonjour claims that given any regularity, the truth of an induced hypothesis is its best *explanans*. He then infer, based on *a priori* knowledge, that best explanations are true. Such *a priori* justification of induction, as any other, doesn't work because it clearly doesn't take into consideration the plurality of hypotheses that could be consistent with the regularity, providing a number of equally invaluable explanations. In other words, when we consider the various different ways of proceeding inductively beyond a regularity, the force of Bonjour's justification disappears. Furthermore, Bonjour account of induction as justified *a priori* can be seen as relying on an inductive process among many as the inference to the best explanation is generally seen as an inductive process that, clearly non-monotonic, is not taken to be *a priori*. Concerning this last point, Bonjour can insist that we have a rational insight that leads us to perform inferences to the best explanation but then it would be better, for the sake of simplicity, to claim that induction itself is guided by a rational, unanalysable insight.

Quite apart from his problems with the justification of induction, Bonjour's conception of reason has other weak points. On his account, reason has this faculty of grasping universal contents at its disposal; these contents being non-conceptual and accessed with no mediation whatsoever. One can view such approach to rational content as falling into a variation of the myth of the given, although Bonjour is clearly at odds with nominalism (see his op. cit. pp. 214-215). In Kantian terms, Bonjour's rationalism takes ratio-

nal insight to be a product of pure receptivity, without any interference of concepts, of forms of human perception or of the spontaneity of reason. In other words, he postulates a rational content that can be told apart from any conceptual scheme or framework: insight can be gained independently of the conceptual language on which it is expressed. This is the reason why Bonjour has to reject Kant's view on the synthetic a priori judgements (pp. 22-26) since he has to maintain that those judgements could be possible beyond space and time. Bonjour's rational insights, intellectual intuitions without concepts, could be identified and individuated only if we could have access to a *noumena*-like reality outside the scope of our conceptual schemes and the cognitive instincts that interact with our reason. An alternative position would be to conceive of these insights as connected to our cognitive structure and as taking place within our concepts. Such a position, where rational insights cannot be thought of without concepts, would be non-foundationalism and would be, in the same sense of Davidson's pallid empiricism, a pallid rationalism.

In any case, the dismissal of empiricism suggested to many that alternatives to foundationalism should be sought. As a reaction against empiricism, Davidson [4] embraces a coherence account of knowledge whereby truth is maximised through coherence among the beliefs, themselves by nature veridical. Davidson relies on the nature of the act of interpretation to claim that ascription of beliefs to an agent has to satisfy a charity principle whereby we can make sense of her behaviour. If we don't ascribe mostly true beliefs to an agent, no interpretation is possible. Beliefs, it is argued, are subsidiary on interpretation and therefore a belief set held by an agent cannot be massively wrong and still interpretable.

A coherentist view of knowledge such as the one Davidson proposes considers that experience cannot play but a causal role in cognition and therefore justifications are supported by the world only through beliefs. Those, that could not be divided into observational and non-observational ones, cannot have its empirical content extracted as empiricist devices are not available. All the elements in a system of beliefs share empirical content and can be revised in order to maximise truth. The coherence image of justification puts forward an image of reason according to which every element depends on every other and any choice of revision faces a tribunal where other alternative revisions are considered. Coherence, what justifies a belief, is a goal for reason.

Coherence accounts of justification face a number of problems. First, one could say that the requirement of belief set consistency is too stringent as it is

often hard and sometimes not feasible to guarantee consistency of non-trivial belief sets [9]. The coherentist can reply to this by taking coherence to mean not a property of justified beliefs but rather a goal for rationally examined belief sets. Second, it can be said that revisability is always constrained by our cognitive propensities and biases as reason is not floating in the air. This problem will receive attention in the next section as we elaborate the connection between reason and inductive biases. Finally, it is often said that coherentism lacks contact with the world as experience doesn't play a justification role, it doesn't account for the way argumentation has bearings in reality.

John McDowell [10] sees epistemology as oscillating between falling into the myth of the given that conceives of experience as pure reception and the picture of internal coherence where belief sets, as he says, spin in the void as they cannot have but causal connection to reality with no justificatory import. He endeavours to take epistemology to a rest outside this oscillation. He sees coherentism as putting forward an image of thought as confined within its own sphere since we cannot reach our senses without our conceptual scheme. Davidson's doctrine of the essentially veridical nature of beliefs aimed at establishing a contact between the world and the workings of reason but McDowell claims that this is not enough for one can still be motivated towards empiricism if reason is left alone in its exercises of pure spontaneity (see [10] pp. 13-18). McDowell insists that experience has to be pictured as a rational constraint on thinking, because we should resist the empiricist image of experience outside the scope of a logical space of reasons.

The position he recommends follows from an attempt to give an end to the oscillation above while acknowledging that in the mind, spontaneity and receptivity cannot be even in principle separated[13]. Hence experience, although passive, requires spontaneity. McDowell tries therefore to combine the empiricist idea of a rational import of experience on thought to the rejection of the given as a pre-conceptual non-justified justifier. The idea is that our conceptual capabilities that constitute a logical space of reasons are not bounded in any sense, they are not confined but rather open to the world through experience. Concepts can reach everywhere as there is no limits to what is thinkable and as they reach the world they acquire

[13]Notice that Bonjour's view of rational insight could be said to assume, with the empiricists, that receptivity can be separated from the spontaneous acts of reason since the insight is seen as separated from the concepts that describe it.

content through experience without the need to leave the logical space of reasons. Justifications, traced back, cannot reach beyond thinkable contents but those are constrained by reality as they

> *... are contents of experiences, and in enjoying an experience one is open to manifest facts, facts that obtain anyway and impress themselves on one's sensibility. [...] To paraphrase Wittgenstein, when we see that such-and-such is the case, we, and our seeing, do not stop anywhere short of the fact.* [10] p. 29

This openness to the external world allows reason to get in contact with facts directly through its sensibility that cannot be separated from the exercises of its spontaneity. The logical space of reasons, filled with norms and therefore with free revision and responsibility, expands itself unboundedly towards the world and through this receives rational input from experience. Empiricism is consequently replaced by a notion of reason that expands itself towards the world, including it in a borderless space of justifications. Experience is therefore where we go from our native space of reasons, and as we go we take our conceptual apparatus.

McDowell's position can be understood as an attempt to find the bearings of reality on thought through exploring the idea of an unbounded reason that reaches reality through experience making no appeal to a alleged justification power of the inputs received by our sense organs. This position is meant to contrast both with coherentism and with empiricism and, together with Davidson's and Bonjour's position, indicate a way we can think about reason and its relation to experience in a non-empiricist manner.

4 The hull of the boat

Most of our beliefs are justified by induction. Yet, no inductive practice can be justified but by induction. Inductions succeed or fail, this, however, can only be established by induction as their success is a pure matter of contingent fact. If we can justify inductions at all, we can do it only through other inductions. If induction is unwarranted, so is the justification of most of our beliefs and, I shall argue, reason itself.

Cognitive science, as do in fact most of those that wish to explain how reason fits in a natural world, assumes that there is a (possibly computational) cognitive machinery responsible for maintaining beliefs. It approaches justification willing to find links between beliefs and facts; justified

beliefs are reliable beliefs. It approaches induction by talking about inductive tendencies and how they fit in our overall adaptation to our environment.

Arguments for a robust, non-naturalisable notion of reason are based on a criticism of the empiricist idea that observations provide a link between a natural world of causes (or laws) and the rational space of justifications and doubts. Since sense data alone could not provide justification for any belief, it becomes natural to think of reason as, in a sense, closed in itself. Reason can be about nature but it becomes harder to fit it within nature.

Reason depends on induction to be about nature. Induction is made out of empirical contingencies for it cannot have a starting point that is, in any sense, more justified, from the canons of reason, than any other. Therefore the image of reasoning as abstract activity that takes place in a space of justifications disconnected to causes cannot apply. Nelson Goodman [7], based on Dummett's work on the justification of deduction, has pointed out that as induction depends on induction, deduction depends on deduction to be justified. However, there is a sense in which deductive practices dispense with the world and this is the sense in which we wrap the notion of reason around deduction. Although deduction requires deduction to be vindicated, deductive success is not in any sense tied to how the world is. Inductive success, on the other hand, depends on the world. Moreover, a system of beliefs can only be justifiedly said to be about the world if the world is believed to carry on behaving as it did so far with respect to what the system of beliefs claims. Without regularities, there is no public language, no shared set of beliefs.

Reason's contact with the external nature is not given. Observations alone cannot produce contents of reasoning for justification. Justifications needs empirea, but they get it through reports. The sapience involved in applying a concept in a (non-inferential) report implies taking a position in the space of justifications, i.e. mastering the inferential role played by the report. he reporter has to be aware of the responsibility involved in her report. Sellars [18] calls it endorsement, and it carries a normative element. A reporter endorses an observation through the trust she received when she learned how to associate observation statements to observation. Not only she has to have been exposed to the right objects and events, as we saw above, but she has to share the accepted inductive biases.

Induction brings the world to the reason. Yet, induction cannot be at ease in a logical space of justifications. Induction requires itself to be justified. In that sense, induction is also closed in itself. However, without

induction, reason looses its chance to be about the world. The full implication of the odds between reason and induction is that we cannot expect to do more than induce a complete causal history of our inductive procedures. Such a causal history could at best start from evolutionary constraints and explain how we were provided with the inductive procedures that enabled us to induce great part of our commonsense view of the world. From the reason point of view, it seems that if induction is to be seen as a component of our way of justifying beliefs about the world, it has to gain its credentials outside of reason, in a realm of law that induction itself discovers. The alternative, of course, is to keep pure reason out of the reach of induction and either break its linkage with the ordinary manner of justifying beliefs or give up most of these beliefs.

However induction cannot be at home in a realm of nature either. In fact, a causal history of our inductive practices would hardly explain the whole of the inductive grounding of our commonsense view of the world, let alone the features of our scientific methods. The followers of the doctrine of the non-naturalisable reason try to bring induction to their neighbourhood by pointing out that inductive practices are essentially revisable. Revisability, they insist, is a trait of reason. A complete account of our inductive practices cannot be purely causal because as commonsense gets self-conscious and gradually becomes science, we use a space of reasons, partly constituted by induction itself, to revise our inductive habits. One can tell a causal history of our instincts, and include there many of our cognitive tendencies but when induction begins to rely on method [14] (and on theories about the world), reasons, and not causes, seem to be required.

John Pollock [12] called the attention of epistemologists of internalist persuasion, specially of coherentists, to the importance of non-doxastic elements on our process of belief maintenance. The point can be expressed with the help of Neurath's famous sailors's metaphor: our cognitive situation is that of the sailors that have to rebuild the leaky ship at sea; we can change some of the timbers while the ship has to remain afloat. Using Neurath's metaphor, one could claim that the ship, reconstructed in open sea, could have a hull that we cannot rebuild or reshape to our convenience. Surely, as we become aware of our cognitive instincts, we can revise them. As the rebuilding of the ship is done over the hull, revision has to be guided

[14] In this article I use the term "method" to be part of reason and the terms "biases" and "propensities" to be not part of reason but of the cognitive structures underlying it. The expressions "inductive practices" and "inductive procedures" refer to both methods and to cognitive instincts and often to an aggregate of both.

by deeper cognitive instincts. We can never assess some of our cognitive tendencies although of course everything is revisable. Most of these cognitive instincts are inductive biases and propensities. Revisability, one of the grounds of reason, depends on inductive practices that are in their turn revisable. As we go down this line, practices seem to have more causes than reasons.

If induction is part of reason and yet constituted by a causal history of practices, it looks like it can bridge the gap between reason and nature. The follower of the non-naturalisable reason doctrine can insist that induction is matter for cognitive science but also part of a revisable, normative, non-law-like space of justifications. Induction, this would be the trick, deserves a double-aspect treatment. I believe double-aspect approaches are often too vague to be more than a starting point. In this case, "aspects" seems to mean something closer to components than to viewpoints. Induction can bridge the gap neither because it can be seen in two different ways nor because it substantiate the causal element of our justification practices. The gap is bridged by a hybrid where causes are the departure points for reasons and reasons act among causes.

This double citizenship of induction can invoke an analogy with the argument against the justification import of observations. Our cognitive instincts, the argument runs, are not something that can provide justification to any belief. Nor, the argument stresses, can it provide any sort of departure point for reasons since we cannot make sense of any output of a cognitive instinct without the aid of reason itself. In another attempt to develop a double-aspect approach to induction, the argument concludes by claiming that cognitive instinct as such cannot be objects of reason. To talk about reasons and causes as components of inductive practices would be to engage is some sort of sideways-on view whereby reason and nature are seen from outside both.

I claim that this argument reveals the flaws of thinking of reason as closed in itself. Concerning the role of observations in linking nature and justifications, one can say that our knowledge is composed of true statements whose empirical contents cannot be specified. This is Davidson's line. A similar position concerning the causal history of our inductive practices would involve the claim that reason cannot be affected by our cognitive instincts. Reason deals with rational methods and not with tendencies expressed in instincts. It is only when inductive practices enter the realm of vindication and revision that it can be part of reason. One can wonder, however, about what constitutes reason. McDowell conceives of reason as being unbounded.

Our picture of how reason revises inductive practices portraits a ship that can always be rebuilt or reshaped. To the extent that reason takes over, from a causal history, any of our inductive practices, it can revise anything. In fact, revisability has boundaries but reason is made of potentially unlimited reassessment. Neurath's ship's hull is a skeleton of cognitive tendencies that sustain our inductive revisability. In terms of unbounded reason, there is no unrevisable hull. Reason is not open to the influences of external causes, but it is, so to speak, open from within.

One could claim that the hull of the ship is an element of our justification practices that acts as a Given. As Sellars classically argued concerning observations, there is no grounds for taking sensations as pre-conceptual unjustified justifiers. Similarly, one can suspect that our cognitive instincts concerning induction enter the space of justifications in an illegitimate way. However, the moving borders of reason are located not where inductive practices start but where they become a rationally processed inductive methods. In fact, Sellars put forward the image whereby observations are not made by sense data but are rather a product of a public language processing of what we learn to observe. The same treatment can be extended to our inductive methods in so far as they are justification forces only when they become objects of reason. Methods, but not mere cognitive biases or propensities, are directly accessed by reason that take them as revisable norms about how to revise.

It is only through the glasses of our (cognitive) science that we can see the inductive instincts underneath reason. These glasses are the glasses of our inductive methods. Cognitive science provides a description of inductive biases and propensities that are beyond our inductive methods although possibly influential on our inductive practices. As other sciences, it describes nature. It uses observations, our estimates that something is thus and so, to build law-like theories about underlying causes connected to our inductive practices.

As inductive procedures become conscious, regulated by reason and open to revisability, some of the accepted beliefs have their justification shaken. The constant change of inductive practices is one of the main drive for revision within reason. Belief revision is often promoted by revision of inductive practices. Larry Laudan put forward this image of scientific dynamics as involving a reticulate of goals, methods and hypotheses. Reason itself, it can be argued, has something like a reticulate structure. There is a Strawsonian tradition of associating reason with some manifest image beliefs. It is as if parts of the commonsense picture of the world were components of reason it-

self. The image of reason as encompassing inductive biases and propensities previously outside its sphere, doesn't allow much space for unchallengeable beliefs. As induction is taken from the causal realm of tendencies towards the space of methods, its practices and results become riskier.

We know that there are biases and propensities underneath reason because we see reason revising our habits and cognitive science tells us about this habits. This might still look like a sideways-on view. This view is a reason's vertigo. From within reason we feel the world and from the world we understand reason. Perhaps, however, there is no hope of grasping a complete epistemological picture without vertigoes.

5 Diluting reason

If reason is a faculty of judgement that, unbounded, can revise every cognitive instinct, our grounding biases are themselves revisable. The transcendental surrealist explanation of predictive success involves grounding biases; successful theories could change as grounding biases are revised. Reason has the ability to interfere in the course of dynamical biases and help organising a system of the world. Biases, however, are in a sense a row material for reason that it cannot go beyond; one can say that nature can never be entirely incorporated by reason. As reason incorporates biases, it gets mixed with nature if we include in nature the mechanism of dynamical biases. Now, the biases that reason incorporates could lead it to justify any conclusion as one could find biases to produce any conclusion. This is why induction brings nature, the constraints of the environment, inside reason, for our justification procedures, guided by inductive conclusions and inductive methods, are tuned by induction to nature.

The question that needs then to be asked is how can we separate reason from biases. It seems that from the point of view of reason, there is no much substance about the world without the presence of inductive biases. Biases adapt, reasons get revised. Yet, the mechanisms of revision are causally determined by the grounding biases, the hull of Neurath's ship. If rational revisions, revisions informed by reason and not only through a process of bias adaptation, take place, they have to be located amid the the hull of the ship. If there is anything like reason, it has to be diluted in the way we perform cognition guided by our instincts. Perhaps, inductive biases act in human cognition by getting entangled with the norms and values of reason.

The mechanism of justification, on the other hand, informed of the envi-

ronment through induction, have to take nature into consideration. Or, at least, it has to take empirical reality as constituted by our biases into consideration. But if biases get entangled with norms and values, at least from the point of view of reason, the distinction between reason and nature itself looks like a sideways-on view. Perhaps, we cannot separate out what is received by our cognitive instincts from what we spontaneously create through reason. In that case, there could be no sound way of developing a study of inductive biases that assumes something like the inductive *continuum*; no room for a study such as the one this thesis provide.

To resist this conclusion, we need to ponder that nature, as empirical reality, can be studied in isolation from our cognitive mechanisms. The same goes for the empirical reality within us; and this is why we can isolate and investigate inductive biases. This is how we can discover the internal structure of our cognition from within. Yet, reason itself cannot be isolated from the inductive biases that give substance to the epistemic norms. Reason is diluted, but inductive biases can still be among its objects.

I have been avoiding the topic of skepticism and, to a great extent, shall continue to avoid it. Although the topic deserves an extensive consideration , there is something that can be briefly said. A skeptic can always doubt any conclusion drawn by our biases. Hume's strategy was to admit that our system of the world is partially derived from our instincts. The skeptic is somehow confined to internal questions, within the endeavour to construct a system of the world. If reason gets diluted in nature, to question reason becomes also to question nature that provides the biases for the inductive conclusions. Of course, a local skepticism can be damaging if it can potentially call into question every inference step. But reason has local revisability to deal with every local skeptic. The skeptic, homunculus created by reason, cannot move faster than reason itself. As it questions some cognitive propensities, it has to be based on reasoning that itself has to be entangled with some of our instincts. The skeptic, as reason, cannot have substance without our inductive biases and therefore is himself diluted. If the skeptic is to be fought with reason, we can use the weapons of our image of nature. These image itself can be challenged but every cognitive propensity can also be revised.

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