THE NATURE OF EMPIRICAL KNOWLEDGE IN THE SOCIAL DISCIPLINES

Área de investigación: Teoría de la administración y Teoría de la organización

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> All epistemology begins in fear –fear that the world is too labyrinthine to be threaded by reason; fear that the senses are too feeble and the intellect too frail; fear that memory fades, even between adjacent steps of a mathematical demonstration; fear that authority and convention blind; fear that God may keep secrets or demons deceive. Objectivity is a chapter in this history of intellectual fear […] But the fear objectivity addresses is different from and deeper than the others. The threat is not external […] it is the individual who is suspect. Objectivity fears subjectivity, the core self. […] But there is no getting rid of […] post-Kantian subjectivity. Subjectivity is the precondition for knowledge: the self who knows […and] the root of both knowledge and error.
> L. Daston and P. Galison (2007: 372-4) [1]

Introducción

The tenets of Classical Empiricism and the science of Isaac Newton overthrew ancient forms of thought with the conception of a rational universe governed by invariant universal laws, and hence, knowable and predictable. Empirical science could investigate the regularities observed in the world, and establish their causes as causes inherent in nature or in human nature, while rejecting any reference to non-empirical entities as mere speculation, and regarding theoretical entities only as working hypotheses. The struggle against all metaphysics as regressive and obscurantist forms of thought, outlined a scientific viewpoint under a rationality which could confront fiction and dogma, and in general, belief in the supernatural under any form. Indeed, science always was at the forefront of the struggle against authoritarianism and superstition. It is to science that we owe our greater intellectual freedom from religious beliefs, and the liberation of mankind from ancient and rigid forms of thought. (Feyerabend, 1975: 156.) Then the metaphysical dimension, which had been a genuine field of rational thinking became irrational and non-scientific; and this parting of science and philosophy was by itself a historical event. (Marcuse, 1964: 189, 202-3.)

Unquestionably, tenets of Logical Positivism remain today deeply ingrained in science such as scientific knowledge being established in research by contrasting hypotheses derived from theories against the empirical evidence of phenomena in the world, and progress in science being brought about by overthrowing earlier paradigms under a process that ultimately rests on this same evidence. In fact, it has been this view that relatively very recently has resulted in the suppression, not only in the sphere of science but also in Western Culture at large, of the conception associated with the Renaissance of laws of nature and indeed of a natural world designed, integrated and

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[1] All references contain the year of the original edition and the pages of the edition consulted.

animated by an intelligent mind, a divine creator. (Collingwood, 1945: 5.) However, there is an asymmetry between the effects these ideas have had as well as the status they are granted today both in science and in society, and the discredit associated with them both in philosophy of science and in epistemology.

In this context, this paper seeks to review questions about empirical knowledge and research, particularly in the social disciplines, illuminating this by drawing parallels to other types of knowledge, as follows: a) the foundations for analytical and empirical knowledge and their epistemic status; b) the epistemological problems of foundationalism, and the answers of some epistemologists to arguments against foundationalism; and c) the justification of the findings of quantitative research on natural and social phenomena by empirical evidence represented via conventional methodologies to constitute the foundation for empirical knowledge, and an analysis of the characteristics of empirical research and knowledge in the social disciplines.

1. What is the place of empirical science in the context of knowledge?

In establishing the justification for knowledge, epistemology has to look in opposite directions to trace the origin of two types of ideas in the views of Classical Rationalists and Classical Empiricists –and in line, much later, with the demarcation between metaphysics and science by Logical Positivists. Thus, while René Descartes could discount the testimony of the senses as sensation does not belong to the core self, the res cogitans, and Gottfried Leibniz (1765: bk. I, ch. 1) claimed that there are innate notions that "exist in the soul in a potential manner," and are not "acquired by experience or tradition," such as the idea of God, and ideas of logic, arithmetic and geometry –or truths of reason, distinct from truths of fact—John Locke (1690: bk. II, ch. I, § 2 and bk. I) concluded that "all knowledge is founded on experience," and David Hume (1739-40: bk. I, p. 105) affirmed that "all our ideas are derived from the corresponding impressions".

Clearly, Classical Rationalists and Classical Empiricists were referring to two different kinds of concepts. The former were examining the origin of non-empirical notions, while Locke and Hume were discussing knowledge of the outer world through sense experience. Now, in the realm of metaphysical ideas such as the analytical statements of logic and mathematics, or statements whose denials are self-contradictory, these are of a different nature than that of metaphysical systems of thought such as philosophical theories and religious doctrines. Thus, the epistemic status of three different types of concepts contained in metaphysical, analytical and factual statements is to be determined.

1.1 Truth and justification of beliefs

The idea that reasoning cannot justify beliefs can be traced to Sextus Empiricus's Outlines of Pyrrhonism where he discusses the regress problem, and three modes of reasoning are cited –reasoning, as the process of producing reasons for beliefs. For Peter Klein (2003: 39-43) the regress of reasons problem is stated thus: "a trilema [faces] all who attempt to use reasoning to settle matters. Either infinitism, foundationalism or coherentism is the appropriate method of responding to the regress of reasons [in justifying beliefs…] There are no other possibilities. Thus, if none of these forms of reasoning can settle matters, no form can."

"The Mode based upon regress *ad infinitum*… whereby we assert that the thing adduced as a proof of the matter proposed needs a further proof, and this again another, and so on *ad infinitum*, so that the consequence is suspension [of assent], as we possess no starting point for our argument" is called infinitism. Foundationalism refers to "the Mode based upon hypothesis when the Dogmatist being forced to recede *ad infinitum*, takes as his starting point something which he does not establish but claims to assume as granted simply and without demonstration" –*i. e.*, self-justifying statements. And coherentism is "the Mode of circular reasoning… used when the proof itself which ought to establish the matter of inquiry requires confirmation derived from the matter; in this case, being unable to assume either in order to establish the other, we suspend judgment about both."

In a coherence theory of truth –as the counterpart to a correspondence theory of truth, suitable for probing the truth of empirical statements—truth consists in the fact that a belief or proposition fits consistently into certain more general system of beliefs or propositions. A theory of truth is not, as such, a theory of justification; though it is sometimes taken to imply that justification is circular. But in fact the coherence theory appeals to something other than logical consistency and its proponents concede that a system of false propositions may be internally consistent; therefore, logical consistency alone is no guarantee of truth. (Chisholm, 1964: 84.) Indeed, in "A coherence theory of truth and knowledge," Donald Davidson (1989: 125-6) accepts that he does "not hope to define truth in terms of coherence and belief;" concluding that "truth is correspondence with the way things are."

Klein (1999: 165-78) argues for infinitism, or the infinite regress of reasons, whose central thesis is that the structure of justificatory reasons is infinite and non-repeating, and concludes that "for the infinitist all justification is provisional;" and "although every proposition is only provisionally justified, that is good enough if one does not insist that reasoning settle matters once and for all." But if a proposition is "justified only when the belief in it results from a process of justification that has been concluded," then "the kind of final guarantee that Descartes and others have sought is not available if infinitism is correct." Therefore, if the infinitist's objections to

foundationalism[2] and coherentism hold, the specter of skepticism would stand at the end of this line of reasoning.

1.2 The epistemic status of metaphysical and analytical statements

Positivist philosophy would maintain that metaphysical statements are not entitled to the name of knowledge since they cannot be disproved by any conceivable method (Kolakowski, 1966: 207); but in any case, they are to be granted an undefined epistemic status –or metaphysical systems such as philosophical theories and religious doctrines may be provisionally justified, according to infinitism, and their internal consistency may be established under coherentism.

Logic and mathematics were for Immanuel Kant ([1781b]: 15-8, Introduction, §§ I-VI) the formal sciences with purely axiomatic conceptual frameworks, whose analytical statements hold deductive, necessary, *a priori* truths, with absolute universality, *vis à vis* the comparative universality of inductive, contingent, *a posteriori* knowledge expressed in the synthetic statements of the empirical sciences. Rudolf Carnap (1931-2: 28) and the Logical Positivists of the Vienna Circle conceived logico-mathematical propositions as the purely tautological expressions of the language and also regarded both formal sciences as true knowledge, whose premises "by themselves are not empirical statements, but assist in [their] transformation." Formal systems are expected to be internally coherent.

Now, while formal logic appeared to be an accomplished project, mathematics went through a process of formalization during the XIX century, eliminating much of the vagueness and many of the contradictions present, giving precise definitions for concepts and articulating the basic principles of central mathematical theories. By the last decades of that century the program of logicism held the aim of reducing mathematics to formal logic. It consisted of the claim that all mathematical truths could be translated into logical truths, or that the vocabulary of mathematics constituted a proper subset of the vocabulary of logic. Second, it consisted of the claim that all mathematical proofs could be recast as logical proofs, or that the theorems of mathematics constituted a proper subset of the theorems of logic. In Bertrand Russell's (1959: 74) words, the logicist's goal was "to show that all pure mathematics follows from purely logical premises and uses only concepts definable in logical terms". (Irvine, 2015: § 1, Horsten, 2012: § 2.1.)

By the turn of the XX century, Gottlob Frege felt that his life's work had finally attained a solution to the logical foundation of mathematics by applying set theory; however, it contained a contradiction which was central to the development of his whole system, and this was pointed out by Russell. If set theory was contradictory, no mathematical demonstration based on it
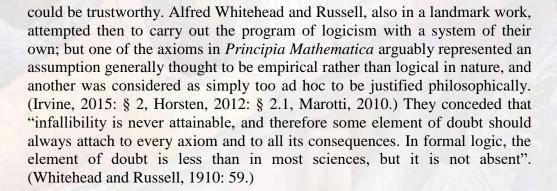
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[2] Empirical knowledge and foundationalism will be analyzed in the following section.

could be trustworthy. Alfred Whitehead and Russell, also in a landmark work, attempted then to carry out the program of logicism with a system of their own; but one of the axioms in *Principia Mathematica* arguably represented an assumption generally thought to be empirical rather than logical in nature, and another was considered as simply too ad hoc to be justified philosophically. (Irvine, 2015: § 2, Horsten, 2012: § 2.1, Marotti, 2010.) They conceded that "infallibility is never attainable, and therefore some element of doubt should always attach to every axiom and to all its consequences. In formal logic, the element of doubt is less than in most sciences, but it is not absent". (Whitehead and Russell, 1910: 59.)

Finally, in the first decades of the XX century, David Hilbert's program was an attempt to prove the consistency of the axioms of mathematical analysis in classical arithmetic. On the formalist view in the philosophy of mathematics, a minimal requirement of formal systems of mathematics is that they are at least consistent. But the program did not succeed in proving the consistency of the axioms of Peano Arithmetic in Peano Arithmetic. And Kurt Gödel proved that there exist arithmetical statements that are undecidable: Peano's system does not prove its own consistency --its consistency is independent of Peano Arithmetic itself. Gödel proved that no consistent axiom system can cover mathematics even when we renounce self-evidence –their formal systems are incomplete, that is, not all true theorems can be demonstrated, or they are contradictory, that is, the consistency of the systems cannot be proven. (Horsten, 2012: § 2.3, Marotti, 2010.) Gödel's theorems "showed the impossibility of entirely formalizing a theory by its own means and the necessity of basing it on 'stronger' instruments than their own and not more elementary". Gödel showed "the nature of a construction which no longer rests on a base but is constantly subjugated to its subsequent states." (Piaget, 1970: 146.)[3]

Willard V. Quine (1969: 528) recaps that the studies in the foundations of mathematics, in the attempt to reduce this discipline altogether to logic, was in fact a reduction to logic and set theory; and that the firmness and obviousness associated with logic could not be claimed for set theory. Ideally, the definitions of mathematical terms would have generated all the concepts from clear and distinct ideas, and the proofs would have generated all the theorems from self-evident truths, end truths or axioms, but this project did not succeed. Likewise, the attempt to prove the consistency of the axioms of these formal systems showed instead that they are incomplete, and we cannot prove their consistency. Now the clarity and certainty for the laws of mathematics are sought to be maximized, and are no longer regarded as absolute; reduction in the foundations of mathematics does not show how certainty is possible. Still,

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[3] However, as Gerhard Genzen showed more recently, there can be arithmetic theories T_1 and T_2 such that neither is strictly speaking 'stronger' than the other, yet T_2 proves the consistency of T_1. (For this quote and reviewing these sections, I am indebted to Roy Cook, Minnesota Center for Philosophy of Science, Univ. of Minnesota.)

this outcome remains exemplary *vis à vis* the studies in the foundations of empirical science.

1.3 A further critique of Kant's view

Quine (1953: 20) questions the distinction between truths which are analytic, or grounded in meanings independently of matters of fact, and truths which are synthetic, or grounded in fact. Kant conceived of an analytic statement as one that attributes to its subject no more than is already conceptually contained in the subject. Meaning then, refers to the synonymy of linguistic forms or definitions; but these are recorded by a lexicographer as antecedent facts: as synonymy between forms which is implicit in general or preferred usage prior to his own work. With the exception of definitions which appear in formalized systems, definitions reporting instances of synonymy come then as reports upon usage. Certainly the "definition" which is the lexicographer's report of an observed synonymy cannot be taken as the ground of the synonymy. (24-7.) Quine (36-7) concludes that truth in general depends on both language and extra-linguistic fact. Then, in some statements the factual component should be null; and these are the analytic statements. "But, for all its a priori reasonableness, a boundary between analytic and synthetic statements simply has not been drawn. This is an unempirical dogma of empiricists, a metaphysical article of faith."
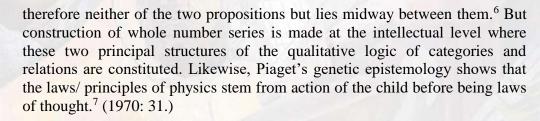
And also the *a priori* nature of the axioms and even of the concepts of the formal sciences is questioned. Jean Piaget's (1970: ch. 2) studies on psychology and epistemology show that even the simplest and most general logical and arithmetical truths are constituted in infancy with the help of experiment prior to a purely deductive operatory arrangement.[4] His genetic epistemology redefines the logical nature or intuition *sui generis* of the whole number, stating that number construction is actually based neither on an extra-logical mechanism, such as a direct and independent rational intuition, nor on pure logic,[5] but on an operatory synthesis, the elements of which are logical without operations stemming from their coordinations entering into operations of categories or of relations. The solution suggested by psychogenetic study is

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[4] Piaget (28-9) affirms: "all knowledge doubtless supposes an intervention of experience; it seems incontestable that without object manipulation, the child would be unable to constitute the one on one correspondences which help him to develop the whole number, nor would the child be able to discover that the sum of a few objects is always the same regardless of its numerical order, and so forth. Even a truth such as 2 + 2 = 4 and above all the opposite 4 – 2 = 2 requires turning to experience. This is also true of the elementary logical transitivity A = B; B = C; therefore A = C, which in no way imposes itself in a necessary manner before" a certain age of the child, as well as of "the relation of identity" (Piaget, 1968: 56).

[5] Henri Poincaré and Luitzen Brouwer considered the whole number irreducible to logical structures and the object of a direct and independent rational intuition, while the logisticians Frege and Russell understood it as a notion based on pure logic. (1970: 38.)

therefore neither of the two propositions but lies midway between them.[6] But construction of whole number series is made at the intellectual level where these two principal structures of the qualitative logic of categories and relations are constituted. Likewise, Piaget's genetic epistemology shows that the laws/ principles of physics stem from action of the child before being laws of thought.[7] (1970: 31.)

1.4 What is the epistemic status of analytical knowledge?

In the formal systems, logic and mathematics, there is no certainty, nor can we prove the internal coherence of mathematical systems. There is no boundary between analytic and synthetic statements, and analytic knowledge is neither a priori nor initially deductive. Ideally, the proofs in the deductive systems of logic and mathematics would have generated all the theorems from self-evident truths or axioms, which could be assumed as granted without demonstration, thus stopping the regress; but certainty is not to be found in those axioms.

2. Is there a foundation for empirical knowledge?

Quine (1969: 529) observes that studies in the foundations of mathematics divide into the conceptual and the doctrinal sides; the conceptual studies are concerned with meaning, and the doctrinal with truth –and this applies to the epistemology of natural knowledge. Therefore, just as mathematics is to be reduced to logic and set theory, natural knowledge is to be based on sense experience, explaining notions and justifying knowledge of truths of nature in sensory terms –the conceptual and the doctrinal sides. On the doctrinal side, Hume did succeed in construing singular statements about bodies as truths about impressions, directly known. But general statements and singular statements about the future, or Hume's problems of induction and prediction, gained no increment of certainty by being construed about impressions, and no progress was made here. In fact, regarding these problems we are not further along today than where Hume left us; "the Humean predicament is the human predicament".

Then, in the epistemology of natural knowledge on its conceptual side, a step forward to take us beyond impressions was the idea of contextual definition, or the recognition of the sentence as the primary vehicle of meaning, as well as resorting to set theory. Here, Carnap's (1928) physicalistic program was to account for the external world as a logical construct of sense data; and on the doctrinal side, his constructions, if carried successfully to completion, would

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[6] Development of the whole number in the child is irreducible to pure logic. (1970: 42.) Whole number intuition is developed through learning –and an intuition which is not primitive is no longer an intuition. (39.)

[7] This is the case of conservation notions such as the conservation of rectilinear and uniform movement and of the permanence of objects (inertia), conservation of energy or conservation of quantity of matter –of weight or of volume, of lengths or of surfaces, and so on. (1970: 32.)

have enabled us to translate all sentences about the world into terms of sense data, plus logic and set theory. But we cannot prove these sentences from observation sentences by logic and set theory. The Cartesian quest for certainty by endowing the truths of nature with the full a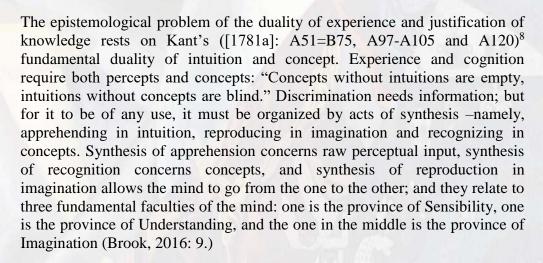uthority of immediate experience seems to be a forlorn hope. (Quine, 1969: 529-30.) The truth and justification of singular statements will be explored in the following sub-sections.

Nevertheless, two cardinal tenets of empiricism remain unassailable to this day: one is that all inculcation of meanings for words must rest ultimately on sensory evidence –the stimulation of his sensory receptors is all the evidence anybody has had to go on, ultimately, in arriving at his picture of the world— and the other is that whatever evidence there is for science is sensory evidence –the conceptual and the doctrinal sides. (530.)

2.1 Knowledge from experience: Kant's model of cognition; the doctrine of the given

The epistemological problem of the duality of experience and justification of knowledge rests on Kant's ([1781a]: A51=B75, A97-A105 and A120)[8] fundamental duality of intuition and concept. Experience and cognition require both percepts and concepts: "Concepts without intuitions are empty, intuitions without concepts are blind." Discrimination needs information; but for it to be of any use, it must be organized by acts of synthesis –namely, apprehending in intuition, reproducing in imagination and recognizing in concepts. Synthesis of apprehension concerns raw perceptual input, synthesis of recognition concerns concepts, and synthesis of reproduction in imagination allows the mind to go from the one to the other; and they relate to three fundamental faculties of the mind: one is the province of Sensibility, one is the province of Understanding, and the one in the middle is the province of Imagination (Brook, 2016: 9.)

Kant's (A77=B103 and B150ff) model of cognition as a threefold doctrine of synthesis represents the conceptual structure of the necessary cognitive conditions within which experience and thought must take place, organizing sensory information by acts of synthesis –acts of putting different representations together, and of grasping what is manifold in them—as one unit of knowledge. The functions crucial for mental, knowledge-generating activity from experience are spatio-temporal processing of, and application of concepts to, sensory inputs, as follows: a) the synthesis of apprehension, which locates appearances in a structure of time and space; b) the synthesis of reproduction, which connects the diverse elements of such appearances by forming an image –or the image of an object—and associates spatio-temporally structured items with other spatio-temporally structured items; and

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[8] References to *CPR* are in the pagination of the 1st (A) and 2nd (B) editions; trans., P. Guyer and A. Wood.

c) the synthesis of recognition, which labels such items with concepts – universals and, particularly, the categories—*i.e.*, for experiences to have objects, acts of recognition that apply concepts to spatio-temporally ordered material are required. (Brook, 2016: 9, 11.)

Now, following Klein (2003: 39), if coherentism is nothing but a thinly veiled form of circular reasoning, and infinitism advocates a process of justification that could never be completed, we are led to foundationalism and the doctrine of 'the given', when we attempt to answer certain questions about justification of empirical knowledge. The expression 'the given' came to be established by Clarence Lewis (1929, chs. 2-3) and others in the first half of the XX century under the conceptions of Kant's model. Lewis distinguishes what mind brings to experience from the given element in experience. Both elements in empirical knowledge are the concept, which is the product of the activity of thought, and the sensuously given, which is independent of such activity. Our cognitive experience, then, involves a form or construction, which the mind imposes on the immediate data of sense, which are presented to it, generating by this activity a chasm between the subjective and the objective. Knowledge of the external world arises through conceptual interpretation of the given, opening up the possibility of error, but there is no knowledge by direct awareness without interpretation. Thus, cognition includes the content as well as the form of knowledge that the activity of thought creates. (36-9, 63.)

Roderick Chisholm (1964: 80-7) states that it is postulated that there are beliefs or statements which are themselves neither justified nor unjustified, or which justify themselves, thus stopping the regress in the process, or dialectic of justification. Then, the doctrine of the given becomes: a) every statement which we are justified in thinking that we know is justified in part by some statement which justifies itself; and b) there are statements about appearances which thus justify themselves. That is, (82, 84) one may believe that there are some particular claims n at which the process of justifying should stop, and one may hold of any such claim n either: a) n is justified by something – experience—which is not itself a claim and which, therefore, cannot be said either to be justified or unjustified; b) n is justified by some claim which refers to our experience or observation, and the claim referring to our experience or observation is itself unjustified; c) n justifies itself; or d) n is itself neither justified nor unjustified. The first one of these alternatives leads readily to the second, and the second to the third or to the fourth. The third and the fourth – which differ only verbally—involve the doctrine of the given.

2.2 Justification of empirical knowledge

Different analyses of the question of the justification of empirical knowledge lead to parallel conclusions, as follows. Carl Hempel (1952: 621, 628) observes that acknowledging experiential statements as true is psychologically motivated; but beyond the ordinary commonsense psychological assumptions, within the system of statements, which express scientific knowledge they

function in the manner of postulates for which no grounds are offered. He adds that when an experiential sentence is accepted on the basis of direct evidence, it is indeed not asserted arbitrarily; but to describe the evidence in question would simply mean to repeat the experiential statement itself. Then, in the context of cognitive justification, the statement functions in the manner of a primitive sentence, and Chisholm (1964: 85) states that when we reach a statement having the property just referred to –an experiential statement such that to describe its evidence "would simply mean to repeat the experiential statement itself—we have reached a proper stopping place in the process of justification. We are thus led to the concept of a belief, statement, claim, proposition, or hypothesis, which justifies itself."
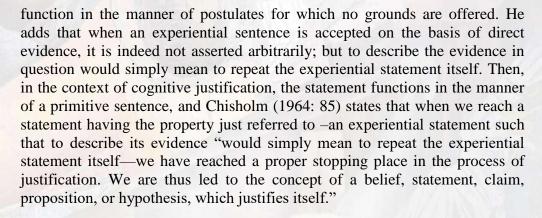
Now, the belief in self-justifying statements may be analyzed further. For Carnap (1936: 125), the procedure of scientific testing as confronting a statement with observation as well as with previously accepted statements leads to the acceptance of empirical statements. He claims that, *e.g.*, the statement 'I am hungry' may be accepted; or if one sees a key, one may accept the statement 'there lies a key.' But both examples differ. The first one is a statement about one's own subjective state, and it is self-justifying. But stating the second one does not enable us to stop the regress when we are referring to knowledge of the external world. To the question 'what is my justification for thinking I know that there lies a key?' the answer would be 'I see the key;' and while we cannot ask 'what is my justification for seeing a key?' we can ask 'what is my justification for thinking that it is a key that I see there?' The possibility of this question, and its answer, indicates that we cannot stop our questions about justification of a statement merely by appealing to observation or experience. For, of the statement 'I observe that that is an A,' we can ask, and answer, the question 'what is my justification for thinking that what I observe is an A?' Thus, an observation statement cannot be incorrigibly justified.

Laurence BonJour (2008: 363-7, 376) develops a fundamental objection to all forms of externalism, as one species of foundationalism, referring to David Armstrong's and Fred Dretske's views.[9] The distinguishing characteristic of epistemic justification is its internal relationship to the cognitive goal of truth, but under an externalist solution to the regress problem, though there must be a reason why a basic or non-inferentially justified belief is "likely to be true, the person for whom such a belief is basic need not have any cognitive grasp of this reason" –*i.e.*, these matters may be entirely external to him. It is required too that the knower believe that the externalist condition is satisfied, but not of course that this belief be justified. Then, after presenting effective counterexamples to the externalist position, BonJour concludes that it "seems to amount merely to waiving the general requirement" of justification of a belief. If this "were acceptable generally, then it seems that *any* true belief

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[9] Armstrong's, as presented in his *Belief, truth and knowledge*, and Dretske's, in his *Seeing and knowing*.

would be justified", and this would be utterly arbitrary. "Thus externalism looks like a purely *ad hoc* solution to the epistemic regress problem." (370.) Finally, he agrees that if only certainty will suffice for justifying beliefs, this view would lead to skepticism about empirical knowledge, as one has "justification adequate to exclude all possibility of error" only for beliefs about one's own mental states. (374.)

Alvin Goldman (2008: 379-88) attempts to reveal fundamental problems of internalism, which is based on: 1) "the *guidance deontological* (GD) *conception of justification*[10] is posited; 2) a certain constraint on the determiners of justification is derived from the GD conception"; 3) "the accessibility or knowability constraint is taken to imply that only internal conditions qualify as legitimate determiners of justification" –and these justifiers are internal facts or states of affairs that justify a belief, that the cognitive agent can know to obtain or not to obtain. So, justification must be a purely internal affair. This means that one's epistemic duty is to "believe what is supported by one's evidence and to avoid believing what is not." (Feldman, 1988: 254.) But Goldman remarks that for an internalist no perceptual experience would be justificationally sufficient for a belief, and this would apply to cases of forgotten evidence too; or else an unqualified version of the knowability constraint on justifiers will not restrict all justifiers to internal conditions in preference to these two external conditions –perceptual experience and forgotten evidence—which is precisely the internalist's stated aim. Then, he observes that internalism as a theory of epistemic justification leads to skeptical outcomes.
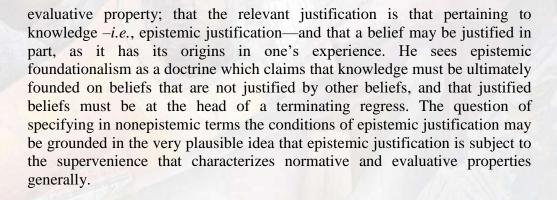
2.3 The antifoundationalist argument

Finally, this inquiry may be regarded in terms of the antifoundationalist argument. It affirms: a) every mental state either does or does not incorporate a propositional attitude; b) if a mental state incorporates a propositional attitude, then it cannot serve as a foundation for knowledge, because it does not give us direct contact with reality –*i.e.*, with pure experience unfiltered by concepts or beliefs—hence it is fallible, providing no secure foundation, no guarantee against error; and c) if a mental state does not incorporate a propositional attitude –*i.e.*, if it has no conceptual or propositional content—then it cannot serve as a foundation for knowledge, because it cannot provide logical support for a hypothesis which must be a belief with its truth and justification in question. Hence, no mental state can serve as a foundation for knowledge.

For Ernest Sosa (1980: 145-53) the claim that only propositions can justify propositions rests on an Intellectualist Model of Justification, and he probes foundationalism, observing first that justification involves a normative or

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[10] "The idea behind GD is that one ought to guide the formation of one's beliefs by the amount and strength of the evidence one has on hand." (Pappas, 2014: 15.)

evaluative property; that the relevant justification is that pertaining to knowledge –*i.e.*, epistemic justification—and that a belief may be justified in part, as it has its origins in one's experience. He sees epistemic foundationalism as a doctrine which claims that knowledge must be ultimately founded on beliefs that are not justified by other beliefs, and that justified beliefs must be at the head of a terminating regress. The question of specifying in nonepistemic terms the conditions of epistemic justification may be grounded in the very plausible idea that epistemic justification is subject to the supervenience that characterizes normative and evaluative properties generally.

Sosa adds, that the justification of a belief supervenes on such non-epistemic properties of it as its content and its basis in perception; and such a doctrine of supervenience may itself be considered a grade of foundationalism. This is a formal foundationalist theory that explains how epistemic justification supervenes on the nonepistemic. Then substantive foundationalism states that there are ultimate sources of justification other than relations among beliefs that pertain to the content of the belief or its relations to the subjective experience of the believer. A belief about experience may be justified only if one is justified in believing that no factors are present that would cause him to make mistakes on the matter of that belief. Sosa appeals to the infallibility of introspective beliefs; but the fact is that epistemic foundationalism is in the context of the fallible justification of knowledge of the external world. (154.)

2.4 Is foundationalism a successful response to Pyrrhonian skepticism?

To generate knowledge from sensory input the mind performs an interpretation or synthesis of the content of intuition (Lewis, 1929: 214) in two steps: first, it identifies objects and relations among them in the appearances being apprehended in experience; in another step, the mind, associates with concepts objects and their perceptible characteristics, as well as the many types of relations among them. The constructions of thought, which the mind imposes on organized sensory information, constitute our knowledge of the world. Clearly both steps are fallible, and each one takes the mind further away from any certainty that might have been granted to those appearances. Excepting statements about self-justifying subjective states, only fallibly justified statements about external experience and fallible empirical knowledge are accessible to us. Pyrrhonian skepticism cannot be defeated under the classical epistemological notions. Only a redefined epistemology and a conception of knowledge without a condition of absolute truth, would allow us to have genuine knowledge of the world as fallible knowledge. (Olivé, 1999.)
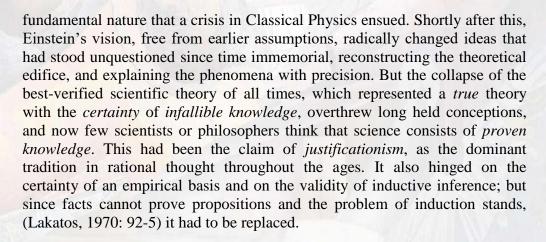
3. What is the epistemic status of knowledge in the social disciplines?

By the end of the XIX century, small deviations from the laws of Newtonian Mechanics were observed, and although they were small, they were of such a
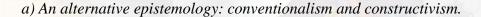
fundamental nature that a crisis in Classical Physics ensued. Shortly after this, Einstein's vision, free from earlier assumptions, radically changed ideas that had stood unquestioned since time immemorial, reconstructing the theoretical edifice, and explaining the phenomena with precision. But the collapse of the best-verified scientific theory of all times, which represented a *true* theory with the *certainty* of *infallible knowledge*, overthrew long held conceptions, and now few scientists or philosophers think that science consists of *proven knowledge*. This had been the claim of *justificationism*, as the dominant tradition in rational thought throughout the ages. It also hinged on the certainty of an empirical basis and on the validity of inductive inference; but since facts cannot prove propositions and the problem of induction stands, (Lakatos, 1970: 92-5) it had to be replaced.

3.1 The present conception of empirical knowledge

During the XX century, many of the earlier assumptions were questioned and a new outlook of the true nature of scientific knowledge emerged, under new epistemological conceptions.

a) An alternative epistemology: conventionalism and constructivism.

Lewis (1929: 29-34, 121) asserted that the world of experience is not given in experience: it is constructed by thought from the data of sense. Experience is not complete; it is not just given but is in part a product of the mind… and without its concepts there is no knowledge. And Ludwick Fleck showed that scientific facts have a genesis and a development; they do not exist independently of people, they are social constructions. Thomas Kuhn (1962) observed also that theories are tested against empirical evidence of a fallible and conventional nature that is devoid of certainty and objectivity. It is interpreted and evaluated intersubjectively by scientific communities, which also ponder experience and experiment and alternative theories to consider their acceptance or rejection in decision processes that establish agreements or conventions about scientific knowledge that are valid for all members of a community –*conventionalism*, which is consistent with the view that knowledge is a social construction.

The thesis of *constructivism* is that conceptual frameworks or paradigms shared by epistemic communities possess a strong ontological implication: they are constitutive of the objects of knowledge –they consist of metaphysical assumptions, epistemic and ethical values, norms of methodology and other elements. Hilary Putnam (1981: 49-54) explains that 'objects' do not exist independently of conceptual schemes. We cut up the world into objects when we introduce a scheme of description… objects are as much made as discovered, as much products of our conceptual invention as of the 'objective' factor in experience, the factor independent of our will. And truth is some sort of (idealized) rational acceptability, some sort of ideal coherence of our beliefs with each other and with our experiences *as those*

experiences are themselves represented in our belief system –and it is not correspondence with mind-independent or discourse-independent 'states of affairs'.

Under constructivism, the Platonic conception of knowledge as justified true belief is revised. The condition of absolute truth, which is inaccessible to the human mind, is removed, and the element of truth is amended; then, a person's justification for a belief is redefined as having *objectively sufficient reasons* to accept it. A reason is objectively sufficient, independently of the judgment of the one who holds it, if it is sufficient for any possible individual of a *relevant epistemic community* –requiring its members' consensus. Intersubjectivity guarantees the *truth* of a judgment, establishing its validity independently of the one judging. A relevant epistemic community is the set of *relevant epistemic subjects* for a belief –and these are all individuals for whom the same reasons and not others are accessible. (Villoro, 1982: 175, 150, 147.) Thus, knowledge is established by consensus in epistemic communities and is valid intersubjectively for all members. Then under this revised, alternative epistemology the construction of genuine knowledge of the world can take place as *fallible propositional knowledge*. (Olivé, 1999.)

b) Justification of research findings by objectively sufficient reasons

Scientific research projects and quantitative social research projects are aimed at testing with methodological thoroughness the hypotheses that are implicit in causal models to explain the regularities observed in the phenomena under study by establishing their determinants with statistical confidence. Those findings are generalized from representative samples to universes of reference as facts from which to draw conclusions and implications for theory, which may be acceptable intersubjectively for research communities as fallible propositional knowledge. Propositional knowledge is justified by objectively sufficient reasons that may be corroborated by any researcher who has access to them, and they may be transmitted to others in a research community, allowing all its members to reach consensuses with intersubjective validity.

Propositional knowledge is in the realm of intersubjectivity. Richard Rorty explains that 'objectivity' is a matter of intersubjective consensus among human beings not of accurate representation of something nonhuman. Thus, those reasons are 'objective' in the sense that they are incontrovertible for any member of an epistemic community; they are intersubjective. Objective reasons in this sense justify intersubjective beliefs. (Villoro, 1982, 1993: 345.) Then the reasons that make acceptable research findings, their conclusions and their contributions to knowledge are their having been established with high or with very high levels of statistical confidence in quantitative analyses with methodological thoroughness, in projects that are acceptable for the research community in terms of research designs, background knowledge, objectives, models, data, analytical techniques, assumptions and methodological decisions. These are the objectively sufficient reasons that

justify the findings of quantitative research, which are thus established as novel facts that are valid intersubjectively for all researchers.

c) Interpretation of empirical evidence –of the given

Lewis (1929: 155-8, 346, 195) considers that if an object can be known at all, it can be known only in relation to a mind... but the mind's interpretations are never beyond the possibility of mistaken apprehension… bias is inevitably introduced, as there is no knowledge without interpretation. Pierre Duhem (1908: 61, 42-9) recalls: Copernicus observed that "Ptolemy and others had been unable to discover or deduce from their assumptions… the shape of the world and the exact symmetry of its parts... If the hypotheses they had adopted were not mistaken, everything that follows from them would doubtlessly have been verified." But "a theory's harmony with observation cannot transform the hypotheses upon which it rests into demonstrated truths." It was the apparent movements of the bodies of the Solar System, as seen from Earth, what had been represented in Ptolemy's model; but this System produced by the commonsense interpretation of observation does not correspond to the true structure of the World. To achieve this, Copernicus's System had to forsake correspondence with the sensible ordinary appearances in experience; his Model had to be counterintuitive. This is one problem.

Also, referring in particular to his discipline, Duhem (1906: 233-8) says that "an experience in Physics is not simply the observation of a phenomenon; it is the theoretical interpretation of that phenomenon. To interpret observed facts, the observer must be a Physicist who knows the accepted theories and how to apply them. An experience in Physics is the precise observation of several phenomena together with their interpretation, and this substitutes the concrete data really obtained by observing the abstract and symbolic representations, which correspond to them by virtue of the theories that the observer accepts." Now, interpretation of observation and experiment applies to research in the other sciences and in the social disciplines too. Kuhn (1962: 146) saw that testing a theory by empirical evidence requires one to commit oneself to that very theory –the construction of tests must proceed from within one or another paradigm-based tradition—and called the loss of the objectivity/neutrality of evidence theory ladenness.

d) The conceptual element in knowledge

Conceptual frameworks are not mere intermediaries between subjects and objects instead they are significant constituents in the construction of objects. This results in the phenomenon of conceptual relativity that depends upon the fact that the notions of object and existence have a multitude of different uses, and not an absolute meaning (Putnam, 1987: 19), opening up the possibility for world views with different ontologies –even incompatible ones—which may be equally adequate in certain contexts, such as the scientific theories that have been accepted at different times in the course of history. (Olivé, 1999.)
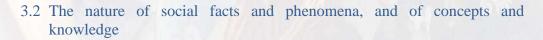
Kuhn (1962: 149-50) states that paradigms emerge when scientists learn to see the world differently. A new interpretation of nature leads to theory reconstruction, and then "the proponents of competing paradigms practice their trades in different worlds," seeing different things and "in different relations one to the other… when they look from the same point in the same direction."

But there is no scientifically or empirically neutral system of language or concepts; they are related to a theory. Since new paradigms are born from old ones, they ordinarily incorporate much of the vocabulary and apparatus, both conceptual and manipulative, that the original one had previously employed, but they seldom apply these elements in quite the traditional way; some of those terms are attached to nature differently. (Kuhn, 1962: 146-9, 198.) Lewis (1929: 267-8) saw that concepts and principles of interpretation are subject to historical change when a 'new truth' is brought about, such as Rudolf Virchow's redefinition of disease. The old word 'disease' had acquired a new meaning; it was retained but the old concept was replaced. Thus, meanings of words change between different periods of the development of a science[11], and they may refer also to a period of the development of an individual's thought, undergoing alterations from one period to another as his conceptions and worldview mature. The use of a term follows a process of development in history… we have a succession of meanings. (67-8.)

3.2 The nature of social facts and phenomena, and of concepts and knowledge

The former considerations apply to empirical evidence in general; but in research in the social disciplines, facts and phenomena, as well as concepts, have certain particular characteristics.

a) The nonempirical nature of social concepts and variables

In quantitative research in the social disciplines a traditional concept like empirical evidence adopts a somewhat awkward connotation, as virtually all terms are of a nonempirical nature;[12] 'empirical' events and phenomena are not actually perceived in experience. *E.g.*, in economics and corporate finance, variables like interest rate, GDP or inflation, and profitability, total debt or investment adopt and change values determined upon pronouncement by persons with such authority or via conventional methodologies. Those values become established as facts that are valid for relevant professional

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[11] Then, 'disease entities' gave place to states of the organism induced by changed conditions such as bacteria.

[12] With few exceptions, *e. g.*, some variables in psychology that may be determined empirically (physiologically) like motivation, fear, anger, joy, stress and others, in the social disciplines variables are of a nonempirical nature, such as leadership style or social class in sociology; business strategy or type of workforce in management; and I.Q. or personality in psychology; or concepts, like rights or justice in law; taboo or culture in anthropology, etc.

communities –or even for society at large. Alternatively, human actions like trading of shares in an exchange generate information about the prices of those transactions; and then computation of, *e.g.*, a stock exchange index results from processing some of that information under an agreed upon methodology. The values of those concepts are registered fittingly, and are accepted intersujectively as facts for which there is no empirical referent; then afterwards, 'empirical' research can be conducted with those variables.

b) The conventional nature of research methodologies

Decisions on which hypotheses arc to be tested define the theoretical framework if they derive from a theory; or else if a project is to set them as empirical generalizations in the context only of background knowledge and the findings of previous research, ascertaining what is to be regarded as established, and explaining away, if possible, conflicting findings involves other decisions. Generating a research design, objectives and a causal model; selecting quantitative techniques, a database, and dealing with atypical observations and/or periods; and constructing the methodology and setting assumptions at all stages of the project requires more decisions. Then, from deliberations with colleagues and revisions of the draft, the early arbitrariness of those decisions turns to intersubjective acceptability by the research community. Additionally, sensitivity analyses by relaxing assumptions to observe how sensitive the original results are to changes in those decisions allow further adjustment of the methodology –findings that must be reported. But regardless, controversial elements in every project are expected to remain, and its conclusions and implications for empirical knowledge will be fallible and corrigible.

c) The probabilistic nature of social phenomena

Social events and phenomena appear as ambiguous, non apprehensible and unfinished, where multiple complementary elements interact in complex systems with an uncertain behavior, and where diffuse regularities show a probabilistic, multidirectional causality with multiplicative nonlinear effects. But indeterminism is also present in the phenomena of mature sciences such as Quantum Mechanics, and its statistical laws are not considered to have a lower epistemic status than that of universal laws –which actually are not truly universal nor invariant. Now, probabilistic predictions from empirical generalizations in social quantitative research cannot be falsified by evidence, and a theoretical pluralism subsists in the social disciplines. But when findings of quantitative research show key causal regularities with high confidence levels, it is through replication of that project to test the same hypotheses with new data, usually involving methodological decisions to solve questions of a different definition of categories, breakdown or coverage, that the consistency of all findings validates an expectation that research can go beyond relativism, to ascertain the existence of regularities in social events and phenomena.

3.3 What is the nature of empirical knowledge in the social disciplines?

In social research evidence has no empirical referent; facts and contributions to knowledge are generated under thorough, conventional methodologies, from interpretation by researchers of findings vis-à-vis accepted background knowledge or theories. Research communities validate intersubjectively evidence, facts, methodologies, research findings and conclusions, and after replications, the explanatory functions of probabilistic regularities are established as social constructions of fallible propositional knowledge, justified by objectively sufficient reasons.

Final reflections and conclusions

Different lines of inquiry on the question find no self-authenticating foundations of knowledge of the external world as a feasible alternative to the specter of Pyrrhonian skepticism standing beyond the arguments against foundationalism. If a belief about experience may be justified only if one is justified in believing that no factors would cause him to make mistakes, and if classical or radical foundationalism in epistemology set the valid standards of justification, and only infallible, indubitable propositions that may be believed with no possibility of error may be called knowledge (*Cf.* Sosa, 1980: 147, 153), this view ends in skepticism as epistemic foundationalism means only the fallible justification of empirical knowledge. But a conception of thought implying that no belief or statement about the external world can be said to justify itself makes it problematic whether empirical beliefs are justified at all; and then, what is the plausibility of a theory of thought and reference which implies that no one knows anything? (Chisholm, 1964: 89.) Therefore, redefined epistemological conceptions were required.

Justificationism, and its idealized conception of knowledge as being proven and infallible, and embodying objectivity and certainty, gave way to conventionalism and constructivism as the viable models for epistemology and science. Clearly, the ideal of absolute truth as 'One true and complete description of the way the world is' would be accessible only from a God's Eye point of view (Putnam, 1981: 49); so on the human level the epistemological notions had to be redefined in terms of the social construction of fallible propositional knowledge, justified by objectively sufficient reasons. The findings of quantitative analyses become established as knowledge by agreement of research communities about epistemologies and methodologies designed for those projects. Strictly speaking, no justification of all those decisions is required if the objectives have been attained through them; they will have been validated pragmatically. Finally, two issues remain to be discussed further: Must one doubt of what one is seeing? And, what is left of objectivity in the realm of the intersubjective construction of knowledge?

Sensory input requires interpretation by the mind to describe experiences in propositions, but interpretations are never beyond the possibility of mistaken
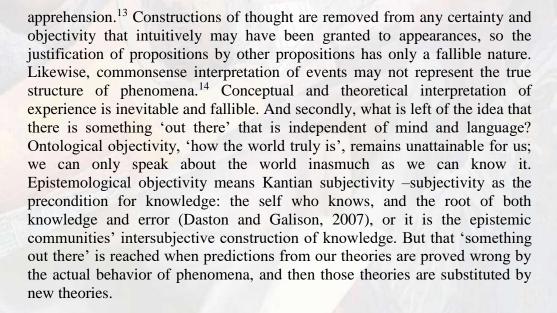
apprehension.[13] Constructions of thought are removed from any certainty and objectivity that intuitively may have been granted to appearances, so the justification of propositions by other propositions has only a fallible nature. Likewise, commonsense interpretation of events may not represent the true structure of phenomena.[14] Conceptual and theoretical interpretation of experience is inevitable and fallible. And secondly, what is left of the idea that there is something 'out there' that is independent of mind and language? Ontological objectivity, 'how the world truly is', remains unattainable for us; we can only speak about the world inasmuch as we can know it. Epistemological objectivity means Kantian subjectivity –subjectivity as the precondition for knowledge: the self who knows, and the root of both knowledge and error (Daston and Galison, 2007), or it is the epistemic communities' intersubjective construction of knowledge. But that 'something out there' is reached when predictions from our theories are proved wrong by the actual behavior of phenomena, and then those theories are substituted by new theories.

In conclusion, no knowledge has certainty even in logic and mathematics, the formal sciences; they are neither deductive nor *a priori* knowledge; and consistency of mathematical systems cannot be proven. There are no self-justifying beliefs that would stop the regress in the process of justification, Pyrrhonian skepticism remains undefeated, and knowledge is fallibly justified. The problem of induction stands, Humean skepticism remains undefeated, and scientific laws and theories are conjectural. Empirical bases lack certainty and objectivity in the sciences and the social disciplines, as observation is not unbiased. Worldviews change when we learn to see the world differently; then concepts and theories change to explain those same phenomena in a new but corrigible way. In the social disciplines nonempirical evidence of their probabilistic regularities is analyzed quantitatively in conventional methodologies to establish explanatory models of those regularities as fallible propositional knowledge, justified by objectively sufficient reasons validated intersubjectively by research communities. And the consistency of findings in replications ascertains the presence of regularities in social phenomena.

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[13] Stating 'I observe that that is an A', I may ask 'what is my justification for thinking that what I see is an A?'

[14] Seeing a sunset, one observer may regard the Earth as fixed and the Sun as 'setting' below the horizon, while another one may regard the Sun as fixed, and the horizon slowly covering the Sun as the Earth rotates on its axis.

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