Epistemology, epistemic belief, personal epistemology and epistemics: A review

of concepts as they impact information behavior research.

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It is incumbent upon every social scientist, no matter their research paradigm, to regularly stand back from their research and ask themselves: "How do I know what I know?" In our research assumptions and in our findings, what counts as knowledge and what counts as a second-order concept such as belief, and why we can confidently say our data or our findings qualifies as one, and not the other, are important questions. Questioning of this kind allows us to be more alert to changes over time, either as to evidence, or to finessed understanding. Such changes can be disciplinary wide in nature, or of more limited personal significance.

How the range of epistemic concepts we bring to research intersect with the theoretical and methodological concerns of information science is largely unarticulated. This is not to say that serious thought has not gone into how information, cognition and behavior relate to knowledge and epistemology, but that a broad overview has yet to be presented. This paper looks to provide an introduction to some of the ways our conceptions of "the study of the social organizations of knowledge, the attributions of knowledge and the representations and uses of knowledge claims in interaction" (Drew, 2018, p.163) operate within the study of information behavior. In so doing, it is hoped, that information science theorists can use the framework to help guide research that looks to foundational, cognitive and sociological explanations across a range of research areas. By clarifying how boundaries of the epistemic concept are sometimes rigid, sometimes permeable, it becomes possible to provide a set of guidelines for research into human use of information which can help to better define what criteria are active in this use, why they are considered so and, finally, how we should represent them as important to the activity in question and the associated ways of knowing implicit in the activity.

Epistemic Justification

Epistemic justification is the "central question of epistemology" trying, as it does, to provide an account of "the rational status of our beliefs about the world in relation to the independent world they purport to describe" (BonJour, 2003, p. 5) and further, what "good reasons for thinking that our beliefs about the world…are true or at least approximately true" (p. 5). Central to our typical experience is that we normally have good reasons, or justification, for many empirical beliefs we hold that are about "our immediate physical environment, about our personal past, about things and events elsewhere in the world, about history, about various results of science, and of course about our conscious experience itself" (p. 6). This is the realm of common sense that refuses to see our empirical beliefs as anything other than entirely rational.

The epistemological position associated with justification, and known as Internalism, can trace its lineage to Descartes, who introduced the notion that by a process of examination of one's self / the knower, we can come to understand what knowledge is. Since the innovation of the *cogito*, it has not been implausible that we "can have a form of access to the basis for knowledge or justified belief" (BonJour, 2003, p. 7). As with many positions in philosophy, an alternative position exists, in this case it is Externalism. Advocates of this position deny that access to one's knowledge and justified belief, through reflection, is always possible.

The two main *accounts* of epistemic justification are characterized as Foundationalist and Coherentist. Foundationalist accounts seek to explain how there is a belief that has a justification that does not depend on another belief. Coherentist accounts base their account on "relations of coherence or agreement or mutual support among beliefs, with no appeal to anything outside the system of beliefs" (BonJour, 2003, p. 7). Epistemologists also divide

accounts of justification into internalist and externalist *approaches*. The internalist view of epistemic justification is based on "elements that are internal to the believer's conscious states of mind in a way that makes them accessible to his conscious reflection" (p. 7), while the externalist approach canvases any source that is not linked to conscious awareness; "a belief's origin or the mechanisms that produce it [is] justified only if it was formed in a way that makes the belief likely to be true" (Watson, 2019, Explaining How Beliefs are Justified). Fuller provides a simple explication of the problem of ultimate justification:

If a principle claims to be self-justifying, then it can always be doubted; and if a principle stands in need of further justification, then this leads to a vicious infinite regress; but every principle must either claim to be self-justifying or it must stand in need of further justification; therefore every principle can always be doubted or it is involved in a vicious infinite regress. (Fuller, 1991, p.1)

BonJour points to how the problem we are dealing with is to explain "how this regress of levels or stages of justification, each dependent on the next, finally ends" (2003, p. 11)— assuming an end can be found. We are left with three alternatives: we find things we recognize to be true that still require a further justification; we find things that depend on justification made in an earlier premise which is, as such, a circular argument and finally, a belief that while there is a reason to consider the possibility of further justification, through recall to other beliefs, some reason, convincingly, allows for any other "appeal to conditional or inferential reasons" (2003, p. 12) to not be considered necessary—"this reason or basis does not appeal to any sort of argument or inference from further premise-beliefs about which further issues of justification could be raised" (2003, p. 12). This is the epistemological position of foundationalism, where beliefs are justified "by appeal to sensory and introspective experience" (BonJour, 2003, p. 13).

A significant amount of scholarly effort has been discharged in seeking to improve upon traditional foundationalism, of the empirical kind, where justification is founded on a basic belief that is claimed to be acceptable without an inferential relationship carrying the thinker's mind back to it. How wide we allow for basic beliefs, whether widely in the case of "beliefs about physical objects" (BonJour, 2003, p. 15) or narrowly, in the case of "beliefs about subjective states of experience" (p. 15) will help determine how we approach alternatives. Foundational basic beliefs are contingent, according to BonJour, in line with the modal status of a proposition, they are "true in some possible worlds and false in others" (p. 15). They must, however, have some reason that allow them to be truth-apt in the actual world. A belief that does not require justification must "possess something tantamount to justification" (p. 16). BonJour points to claims that some reason or quality is "self-justified," "self-evident," "intrinsically justified," or "justified in themselves" (p. 16). These claims suffer from circular reasoning but can show "intuitive plausibility" when "simple necessary truths," such as a basic arithmetic operation, allow for one to "directly and immediately apprehend on the basis of that understanding and without appeal to any further premise or argument that the claim in question must be, and so is, true" (p. 16). While this "rationalist conception of self-evidence" is acceptable within its own domain, it is not, according to BonJour, of any use to analysis of "a belief having as its content a contingent proposition requiring empirical justification" (p. 16).

Basic, foundational beliefs, are "justified by appeal to experience" with the difficult obstacle the means by which to give "a clear and dialectically perspicuous picture of how this is supposed to work" (BonJour, 2003, p. 17). Options for direct apprehension and direct acquaintance of experiential content are problematic, according to BonJour. From sensory experience we move to the putative foundational belief and then a mental act of direct

apprehension of the sensory experience. BonJour asks us to consider "How can this mental act provide a reason for thinking the belief is true?" (p. 17).

Researchers with an interest in how an agent demonstrates an information behavior (and how they formulate their own belief, or that of another, as justified) when the character of the experience is seen as "cognitively given or presented to the person in question via the act of direct apprehension or immediate acquaintance, and is thereby accessible" (that is, foundational) should question the extent to which this actually brings any "regress of justification to a close" (BonJour, 2003, p. 18). What we might seek beyond the direct apprehension, as itself true, as a sensory experience distinct from "reflective apprehension or awareness" (p. 19), is something assertive. BonJour sees a solution to this, in which

a state of direct apprehension is somehow neither fully assertive or judgmental nor entirely and unproblematically non-assertive and non-judgmental…such a state is…semi-assertive or semi-judgmental in character: it has a kind of content or cognitive significance, but not in a way that would raise a further issue of justification. (BonJour, 2003, p. 20)

As a result, these states resemble judgments and beliefs, according to BonJour. They have "the capacity to confer justification on judgmental states proper, while differing from them in not requiring justification themselves" (BonJour, 2003, p. 20). BonJour describes this as still falling short of characterisation of a solution. Any "pre-predicative awareness would still represent or depict something, presumably experience, as being one way rather than another, but that representative content would be nothing like a propositional thesis or assertion, nothing that could be strictly true or false" (p. 20). This then is another way to provide, in BonJour's words, intelligibility to a claim for immunity to epistemic justification (p. 20). What is lacking is a

representative state that is capable of justifying a belief [such that it] must somehow have as at least part of its content the information that the relevant state of affairs is one way rather than another, the way that the belief says it is rather than some way that would make the belief false. (BonJour, 2003, p. 20)

Given our information behavior research context, the message has validity:

for any representation that has an information content of this sort [that is a strong advocacy that observation or adjudication has a warrant for truth-bearing capacity], whether it is strictly conceptual or propositional or not, it will seemingly be possible to ask whether the information it presents is correct or incorrect in what it depicts, even if perhaps not strictly true or false. (BonJour, 2003, pp. 20-21)

Sober-minded epistemology, according to BonJour, largely avoids "the concept of knowledge" (2003, p. 21). Given the restrictions outlined above relating to reasons strong enough to guarantee truth of a belief, it would seem that little is left beyond "simple propositions of mathematics and logic, together perhaps with simple claims about one's own private sensory and introspective experience" (p. 22). Where this abuts "the vastly more extensive knowledge ascriptions of enlightened common sense" epistemologists have, according to BonJour, formulated a weak conception that concedes a form of knowledge allowing a "lesser degree of justification, lower than a guarantee of truth" (p. 22). This is conceded to be more theoretical than practical though, and unlikely to have whatever precise level which ought to be agreed by "any two" philosophers, and serving, merely, as the foil to

a strong (didactic) conception of knowledge. Such a conception, if asserted, is all too likely to trigger skepticism[1] as the natural response, according to BonJour.

BonJour takes the view that while weak conceptions have problems besetting them, familiar ones, based on degree of justification, it is to justification as a substitute for knowledge that we should turn; it surely is less capacious than knowledge, but given the problem of regress, it might be said that there is a reduced burden of proof that allows an adequate working definition to develop. The justifications for our beliefs, while perhaps not constituting truth that constitutes a basic belief, is of a sort that we ordinarily call knowledge. If we do not raise it to a status above that which we can recognize beyond very many recursive beliefs, then perhaps we have no reason to seek higher levels of justification.

So, the attempt to find a strict, self-evident, basic belief that is epistemically justified must appeal, as BonJour notes, "to some condition or state of affairs beyond the belief itself, such as the occurrence of an experience of an appropriate kind" (2003, p. 24). Within this internalist foundationalist context, how experience might be "cognitively available…so that it can provide a reason…to think that the basic belief is true" is an extra requirement for sufficient explanation and may also attract a further set of questions relating to epistemic justification. What appears as a basic belief is not so: "the regress of justification either continues or else ends with beliefs or belief-like states that are not justified at all and so cannot be genuine sources of justification" (p. 24).

Epistemic Beliefs

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[1] Skepticism in epistemology is skepticism as to the possibility of truth being found, reasoned or articulated.

Epistemic belief research in science is largely unencumbered by any of the philosophical problems of epistemology (such as Gettier or skepticism). While it could be argued that there is little that does cross over from philosophical speculation to science (with the exception of how experience mediates the dilemma of infinite justification and how common-sense considerations relating to observation and the reliability of sense perception contributes to this), such a view is somewhat peremptory. Epistemic belief research is primarily oriented within cognitivist traditions in psychology and within instructional inquiry. There are linkages between epistemic belief research and the personal epistemology tradition that relate to shared interest in social ways of knowing. Individual researchers will, in all likelihood, find worthwhile arguments and parallels between philosophical and empirical inquiries into knowledge and belief (not to mention justification and truth) despite the lack of direct translatability between concepts.

A brief overview of research on epistemic beliefs in information behavior research as it is conducted in psychological and information science traditions, while revealing similarities in task focus, indicates a somewhat different set of methodological assumptions relating to agency in operation. The psychological studies reviewed here include Hofer's (2004) study of thinking aloud during online searching, and how this included reflection on the nature of knowledge, beliefs about self-as-knower and the nature of knowing. Another study reviewed, Lee et al (2014), sought to better understand high school students' perceptions of internet-based knowledge. One of their instruments tested views on uncertainty, complexity, self-source (that is, where "knowledge is internally constructed by the self rather than originating and transmitted directly from the internet or authoritative sources," [Lee et al, 2014, p. 395]), and justification. Kammerer and Gerjets's (2012) study of university novice internet searchers, found that those with epistemic beliefs which allowed for the possibility of "correct knowledge" had a greater likelihood of selecting objective

search results. Finally, Mason et al's (2010) study of 13-year-olds' search behavior found that how students approached the internet was specifically influenced by science-related epistemic beliefs.

A range of information science research was also reviewed. Whitmire's (2003, 2004) studies of the relationship between undergraduates' epistemological beliefs, reflective judgment, and their information-seeking behavior included, in part, use of Baxter Magolda's quadripartite Model for Epistemological Reflection (absolute knowing, transitional knowing, independent knowing, and contextual knowing). Swanson (2006) investigated personal epistemology and knowledge construction within the context of information literacy. Huvila (2015) considered epistemic belief in the context of the concept of participation in archival work. Mokhtari (2014) undertook research into how epistemic beliefs of undergraduate students influenced their information-seeking behavior using Schraw, Bendixen and Dunkle's (2002) Epistemic Beliefs Inventory, and his own questionnaire. Walton (2017), also working within the information literacy approach, argued that epistemic beliefs research promises to aid in the development of a new model of information discernment, one which can be partitioned from reasoning, bias and worldview, and is able to better apprehend knowledge states. Black and Allen's (2017) research provided an informed overview of how epistemic belief theories relate to university student development, including how epistemic beliefs change in staged ways that are linked to the learner's cognitive and information literacy development.

What is clear from the educational psychology literature (such as that cited above)—that intersects with information use—is that there is support for a broad approach to epistemic beliefs that can be located in philosophical contexts associated with epistemology; what is knowledge (and the associated connections to questions of certainty and simplicity) and how

do we come to know (and the associated connections to questions of sources and justification) remain important questions, here as well as across disciplines, and especially within those practical research contexts characterized by their focus on information as the mediating variable. Researchers new to the area should be careful in how they approach or appropriate the two ways of knowing, reasoning and observation. While these are never really separate, they do contribute different forms of dogma to a research domain. Epistemology does not constitute more than a broad foundation for scientific research albeit one that has many cognate lessons that researchers may find worthwhile to seek to incorporate into their wider practise.

Personal Epistemology

Personal epistemology has become inextricably bound up with learning and knowing and encounters with new information (Hofer, 2002, p. 3). Hofer locates an origin in Piaget's genetic epistemology. Moehlman (1968) seems to have introduced the term independently with reference to the case historical method he ascribes to Cassirer following Cassirer's publication of *The Problem of Knowledge* (1950). By allowing for overcoming tendencies toward "fragmentation and separation" in theories of knowledge, scholars (and importantly, for our purposes here, students as well!) were empowered to "explore the various areas of knowledge, or disciplines, their subject matters and their methods of inquiry so as to construct a personal epistemology which is relevant, contemporary, and provides the structural foundation for a truly modern metaphysics" (Moehlman, 1968, pp. 78-79). Perhaps Moehlman refers here to Cassirer's view of "science as an integral part of human civilization" (Skidelsky, 2008, p. 21); he notes Cassirer's recognition of the end of "vast structural systems through which philosophy hoped to organize all knowledge" but of continuing demand for "surveying and making new syntheses so as to obtain a long-range

comprehensive historical, philosophical view" (p. 79). This historical case method approach to the problem of knowledge offers, according to Moehlman, the chance to improve the epistemology we use for education.

Brim, writing on child development wrote of personal epistemology

What humans learn during life are axioms, concepts, and hypotheses about themselves in relation to the world around them. We can think of the sense of self as a personal epistemology, similar to theories in science in its components and its operations, but dealing only with a specific person. The important thing to remember is that it is a self theory and that the sterile notion of the "self-concept" has stood in the way of further progress along this particular path. What we should say, more strictly, is that the self is a body of theory, and that it is a segment of a human's whole theory of himself and the world around him. (1973, p. 242)

Psychologists Unger, Draper and Pendergrass used the term personal epistemology unproblematically. Their survey instrument, the Attitudes About Reality Scale, sought to uncover worldviews and aspects of the relationship between "the person and physical and social reality" (1976, p. 67). Hofer also a psychologist, discusses the concept of personal epistemology with an explicit focus on the role of information behavior

In our most mundane encounters with new information and in our most sophisticated pursuits of knowledge, we are influenced by the beliefs we hold about knowledge and knowing. What has been called personal epistemology, epistemological beliefs or theories, ways of knowing, or epistemic cognition, is activated as we engage in learning and knowing…In our professional lives, we confront the learning of new skills and ideas and make determinations

about their value and worth to us. As citizens, we are called on to judge competing claims from officials and politicians, to weigh evidence, and to make decisions about issues of importance to ourselves and our communities. And in the classroom, students regularly encounter new information and may approach the learning process quite differently depending on whether they view knowledge as a set of accumulated facts or an integrated set of constructs, or whether they view themselves as passive receptors or active constructors of knowledge. In each of these situations the adequacy of our epistemological theories will in some way determine what and how we make meaning of the information we encounter. (Hofer, 2002, p. 3)

It is not an arbitrary choice to mention the Social Epistemology tradition within the personal epistemology section rather than in epistemology proper. I have sited it here not because most of it is not epistemology proper, it certainly is that, but it seems pertinent to show how epistemology that is constrained by propositional logic is of limited use to most social scientists, for whom improved understanding rather than certainty of proof is the main expositional goal. Social epistemology, we are often told in an information science context, emerged with Margaret Egan and Jesse Shera's "Foundations of a Theory of Bibliography" published in *Library Quarterly* in 1952. Like many of the concepts referenced in this paper, there has been less than perfect identification of the original as well as "genuine" use of the associated term. Information scientists continue to erroneously attribute social epistemology to Egan and Shera. It is not a pedantic point to make that the concept was first canvased, two-years before Egan and Shera's publication, by Fordham University scholars Robert C. Pollock in "The Basis of a Philosophical Anthropology" and William F. Lynch in "Culture and Belief" (*Thought: Fordham University Quarterly*, vol. 25) who were discussing the concept as a means to oppose "the pre-eminent idea of the isolated intelligence" (Lynch, 1950, p. 449). Even deeper elicitation of the role of a social epistemology was made by

Walter Stark (who was also at Fordham), also in 1950, in his "Towards a Theory of Social Knowledge."

Egan and Shera's advocacy of social epistemology has been influential within library and information science[2] and continues to resonate with scholars today. Setting the record straight on the term does not diminish their original contribution to our field, but helps to cite it within its broader intellectual milieu. Perhaps it is the clarion call for librarians to broaden their scope from materials and use to "an understanding of how the individual achieves a perceptual or knowing relationship to his environment…[and] from the intellectual life of the individual to that of the society" (1952, p. 132) that has seen their insight resonate across the generations. Egan and Shera's social epistemology is influenced by the structural-functionalism and action theory of Talcott Parsons and the work of Crane Brinton, an historian of ideas. There is a sense in which there is some anticipation of how information science might engage in further inquiry into retrieval and behavior (from Cranfield through to TREC); social epistemology

is predicated on the assumption that man is naturally and continuously curious about his environment and that he seeks continually to extend his knowledge in his efforts to control and manipulate his environment. This discipline would undertake to study the kinds of social organization and social behavior occasioned by this universal human drive. (Egan & Shera, 1952, p. 135)

The long hiatus between Egan and Shera's work and professional philosophers' interest in what a social epistemology might look like was broken in the 1980s. Steve Fuller

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[2] The influence is within the theoretical community rather than among practitioners.

and Alvin Goldman initiated separate research programs (and journals). Remedios provides

an informed overview

The points of difference concern the goals, the conceptions of knowledge, and the scope of

study for each of them. The goal of Fuller's social epistemology is to democratize cognitive

authority in terms of science policy and install a constitution of science: How should the

pursuit of knowledge be organized, given that under normal circumstances knowledge is

pursued by many human beings, each working on a more or less well-defined body of

knowledge and each equipped with roughly the same imperfect cognitive capacities, albeit

with varying degrees of access to one another's activities. The goal of Goldman's social

epistemology is to evaluate social practises in terms of whether they promote or impede

epistemically valuable states, such as knowledge. Fuller's conception of knowledge is in

terms of products of normatively appropriate institutions of inquiry, while Goldman's

conception of knowledge is based on the acquisition of true belief, which is what he calls W-

knowledge, or knowledge in a weak sense. S-knowledge, or knowledge in the strong sense,

consists of true belief, plus some additional element or elements. The scope of study of

Fuller's social epistemology is science, while the scope of study of Goldman's social

epistemology is all forms of social interaction that produce knowledge. (Remedios, 2013, p.

54).

Epistemics

While social science researchers should have some familiarity with epistemology to

aid in discerning certainty about their understanding of their disciplinary knowledge and how

they justify what they claim that this is, epistemology should also play a role in "defending

common sense, correcting it where necessary" (Audi, 2018, Introduction). Epistemics takes

the lessons from the philosophical orientation of epistemology and provides mechanisms to allow them to be used across a variety of scientific and humanistic knowledge domains. To describe epistemics as an applied epistemology is to perhaps not see the subtlety of how concepts cross disciplinary barriers. It is certainly not incorrect, but the description is a blunt instrument. The origin of epistemics is almost always ignored by scholars, and information scientists should be especially concerned at this because there is a sense in which our field helps to constitute epistemics. The origin of the term epistemics should be attributed to the British educational psychologist, G. Patrick Meredith. Meredith locates his use of the term to his *A Revision of Spearman's Noegenetic Principles* (1948) and while it is a detailed explication of Spearman, it does not explicitly use the term epistemics. The term used there is epistemic system. In a later review of epistemics, Meredith (1972) canvases how informatic practises operate to inform epistemic understanding. This may be a felicitous oversight as it gives us an insight into his original thought process. Should one be confused as to what epistemics is, it was originally an explication of what an "epistemic system" might look like (albeit, in line with noegenetic principles [knowledge is acquired from observation and experience, and from the inference relationships we glean between known things]). In an article published in the *British Journal of Psychology* in 1951, "The Transmission of Knowledge," Meredith makes clear that what he is focusing on is "the study and structure of knowledge" arranged as fact/data, knowledge record (information), communicative modality and noegenetic process (p. 324).

The development of the concept of epistemics, from the 1960s onwards, can be seen in how the following commentators approached the term. Feibleman (1962, p. 154) argues, within the philosophical tradition, that epistemics is the proof of systems and a sub-branch of metaphysics, it is "a special case of epistemology construed as a highly magnified view of a segment of the ontological field." Bois claims

It has for its objective the knowledge and the practise of the skills of awareness and self-management…Epistemics covers the whole range of man's activities in the arts, in science, in politics, in administrative work and business transactions, in person-to-person encounters, in family life, in education - wherever and whenever human beings are functioning. (1971, p. 186)

Goldman, although having mistakenly claimed the term for himself, did much to bring it to prominence in North America (it might be that he saw no difference between epistemics and social epistemology):

Like much of past epistemology, it would seek to regulate or guide our intellectual activities. It would try to lay down principles or suggestions for how to conduct our cognitive affairs. The contrast with traditional epistemology—at least "analytic" epistemology of the twentieth century—would be its close alliance with the psychology of cognition. The basic premise of epistemics is that one cannot give the best advice about intellectual operations without detailed information about mental processes. Since these processes are most illuminatingly studied by cognitive psychology, epistemics would go hand in hand with empirical investigation of our "information-processing" mechanisms. (Goldman, 1978, p. 509)

Again and again, we see the relationship between reliable cognition and information processing being made clear in how epistemics was understood in its formulative period.

The social psychologist, Arie W. Kruglanski, developed a theory about "the formation of all knowledge" called lay epistemics. Emerging from a framework of causal attribution, it resulted from opposition to "prevailing distinctions among the categories of causes and

between cognitive and motivational processes" (Kelley,1989, p. vii). Attribution was identified "as a special case within a broader 'epistemic' framework" with a wide arc of application "including that about noncausal properties and categories" (p. vii). Motivation is assessed, "in terms directly relevant to the course of the knowing process" (p. vii) with significant attention to the role played by an agent in validating, or invalidating, informational content.

Writing in the *Journal of Documentation*, Guns (2013, p. 300) provides an analysis of informetrics from the perspective of social, documentary and epistemic perspectives. While using the term epistemics in the explanatory discussion, its meaning is somewhat unclear beyond reference to domains having epistemics that can be considered as their constitutive concepts and the relations between them. Drew's (2018, p. 163) more global definition is that epistemics can be seen as "the study of the social organizations of knowledge, the attributions of knowledge and the representations and uses of knowledge claims in interaction." Van Dijk discusses how epistemics explains

why and how experiences as mental models are not only and not always presupposed or implied in discourse, but more generally may also be socially presupposed in other forms of (inter)action… [it is] a theory that explains how knowledge is acquired and reproduced—and then presupposed—by community members and their social practises. (van Dijk 2012, p. 481)

Reed's approach looks to a dialogic and hermeneutic expression of the concept; it is "working epistemics, which is to say an emergent intellectual space for debate about the nature, use, and meaning of truth claims in sociology" (2017, p. 108).

Conclusion

A review of concepts has been provided to help scholars working primarily within information science with a means by which they can better contextualize that most uncontextualized space—the epistemic. Epistemology will always attract the interest of a small proportion of those working in our field and space has limited the possibility of discussing information scientists who have already made inroads into epistemology. Similarly, it has not been possible to discuss, beyond BonJour, what there is to be learned from the analytic tradition of philosophy (*viz.* propositional forms of logic as a mean to overcome the uncertainty and ambiguity inherent in language interaction).

The combination of the so-called linguistic turn within analytic philosophy and the technical implications of critique by Quine, Putnam, Rorty and others, from within that tradition, which sought a variety of connections (aligned with justification, truth and belief) with scientific understanding, changed the landscape upon which the discourse of knowledge was situated on in the twentieth century. The world in which we discuss how we know is also indebted to Nietzsche, to Heidegger, to Merleau-Ponty and to Ricœur and Gadamer. Their historical and, especially, ontological critiques have moved the goal posts for many scholars, away from how we know and how we think we know to who we are, who we think we are and who we might be given our knowledge bases. These inheritors of the legacy of Kant and Hegel are (like the inheritors of Frege and Russell in the other camp) still capable of shedding new light on questions of knowledge, and how we know, when we spend time with their works.

Epistemic justification is only one small part of the epistemology story but its study is a useful starting point and of general value for contextualising what follows from it. Epistemic

belief, so crucial to important work in psychology and instructional science, should be seen as part of the personal epistemology tradition. Personal epistemology is a credible and understandable research program that, while not entirely falling within the broader ambit of philosophical epistemology, does seek to create the linkages between real life and theoretical speculation that offer significant promise to understand people in their lived experience. Information behavior researchers who seek to engage with the ways of knowing and justifying understanding currently used in personal epistemology should find many of the approaches, instruments and methodologies as compatible with their own research traditions.

Epistemics offers a more promising meta-structure within which to site a range of interpretive approaches to information behavior research. As has been demonstrated here, for the first time in many decades, epistemics and information science share many of the process-oriented factors that define what human use of information implies and entails. Epistemics implies that humans have a highly developed capacity to work with information and complex knowledge structures, predicated upon, and constantly working to achieve, some version of skilful coping. Epistemics entails the common sense turn in epistemology that asks us to look at "what there is" and how we can balance all that we already know in an ontological sense with what we might wish to know, justifiably, quantitatively and rationally. Epistemics helps us to work with the ubiquity of information and naturalize it as human-created artifact for the benefit of knowledge worth having. To this end, epistemics incorporates everything that the personal epistemology tradition seeks, and then some. Its most significant informing discipline is social epistemology but cognitive science and information science also play a part as well in naturalizing artifacts produced in research (or distilled from lived experience). Epistemics as a mediating classificatory framework that enables us to incorporate innovations from both cognitive and sociological sciences into a structural account of the transmission of human knowledge, offers access to the rational philosophical tradition it is linked to while

also providing the empirical framework to use this knowledge in scientific studies of human being-in-the-world.

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