


Symptoms of Expertise: Knowledge, Understanding and Other Cognitive Goods

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Abstract In this paper, I want to make two main points. (I) The first point is methodological: Instead of attempting to give a classical analysis or reductive definition of the term “expertise”, we should attempt an explication and look for what may be called *symptoms of expertise*. What this comes to will be explained in due course. (II) My second point is substantial: I want to recommend *understanding* as an important symptom of expertise. In order to give this suggestion content, I begin to develop an account of understanding. Finally, I will draw attention to some consequences of this approach.

Keywords Expertise · Symptoms · Knowledge · Understanding

For Nadja

*All men by nature desire to understand [eidénai]. (Aristotle, *Metaphysics* I, 980a21)*
Knowing a lot [polumathîê] does not yet teach you understanding [nóon].
*(Heraclitus, *Fragment B 40*)*

1 Overview

In this paper, I want to make two main points. (I) The first point is methodological: Instead of attempting to give a classical analysis or reductive definition of the term “expertise”, we should attempt an explication and look for what may be called *symptoms of expertise*. What this

comes to will be explained in due course. (II) My second point is substantial: I want to recommend *understanding* as an important symptom of expertise. In order to give this suggestion content, I begin to develop an account of understanding. Finally, I will draw attention to some consequences of this approach.¹

2 Preliminaries

2.1 Cognitive Dependence as a Case of Social Dependence

The phenomenon of expertise is a special case of the general and well-known social phenomenon that each of us depends on other persons or, as Plato put it, that we do not severally suffice for our own needs, but each of us needs many things, especially many other persons as helpers (*Republic* 369b6–7). Here, we are concerned with *epistemic dependence* (cp. Hardwig 1985) or, as I now prefer to call it, using a more general and flexible term: *cognitive dependence*.

Besides *symmetric* forms of cognitive dependence, there are pertinent *asymmetric* forms. No one can deny that we all depend in countless ways on experts. The ubiquity of asymmetric epistemic dependence is especially obvious in modern societies with a high degree of division of labour and specialization, but it has been part of the human condition at least since antiquity. Thus, it should come as no surprise that the nature and value of expertise is already a

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¹ In this way, I hope to continue my discussion with philosophers (Scholz 2009; Goldman 2009: 274–276; see also Coady 2012; Gelfert 2014) and to open up a discussion with experts of expertise from other disciplines, especially cognitive and social psychology, sociology and political science.

major theme in Socrates' teaching and in Plato's Socratic dialogues.

2.2 Concepts and Contrasts

Among the *asymmetric* forms of cognitive dependence, we have relationships of (a) *laypersons to experts*, e.g., lay public to scientists, patients to medical doctors and clients to lawyers, or (b) *novices to experts*, e.g., pupils to teachers, students to professors or apprentices to master craftsmen.

In these contexts, the word "expert" is typically used as a contrastive term: The putative expert is contrasted with the complement class of all non-experts or, more typically, with a special, contextually pertinent, comparison class of laypersons. In these comparisons, the experts are, typically, deemed the superior part: In certain respects that have to be spelled out, they are supposed to be *better* than the non-experts.

It should be mentioned, though, that "expert" (or at least the closely related term "specialist") also appears in a different contrast, namely "generalist" versus "expert/specialist". Thus, in the legal situation, we contrast the judge, a generalist of sorts, with specialists such as expert witnesses from different fields. In medicine, we contrast the general practitioner with various specialists. And, in most organizations, commercial and non-commercial, we need generalists as bad as specialists. In these contexts, it may well be the relatum that is contrasted with an expert (i.e., the generalist) that is deemed the superior part. (We will come back to the distinction between generalists and specialists after we have heard more about the symptoms of expertise).

Whereas, in the contemporary debate, most authors tend to use the terms "non-expert", "layperson" and "novice" interchangeably, I want to suggest the following terminological distinctions: Let's agree to use "non-expert" and "layperson" as neutral generic terms for all forms of non-expertise. When we want to differentiate in a more fine-grained way, we may use "ignoramus" for a non-expert doomed to stay a non-expert (and typically without an ambition and/or prospect of becoming an expert at some future time), and, by contrast, "novice" for someone who is at present a non-expert but has a prospect of becoming an expert at some future time. Thus, e.g., a student of medicine is a novice relative to this domain whereas I am an ignoramus in this field.

2.3 Questions

Our dependence on experts raises a plethora of epistemological, pedagogical, moral, sociological and political questions (cf. Selinger/Crease (eds.) 2006: 4f.). In the following, I will focus on the *epistemological* and *cognitive* concerns. Thus, my discussion belongs to the flourishing

field of social epistemology and its many applications.² There are, at least, three groups of questions for an epistemology of expertise:

- (Q 1) What are experts? That is, what conditions must a person (or, perhaps, other system) satisfy to be an expert (in some domain d)?
- (Q 2) Are there only experts in a subjective, reputational or "relational" sense, or are there also experts in an objective sense?
- (Q 3) How, if at all, may non-experts identify experts in an objective sense? How are non-experts able to tell apart real experts from pseudo-experts? And, how can they reliably estimate the relative degree of expertise in a set of experts and thus judge reliably which of two or more experts is to be rationally trusted?

3 What Experts Are: Methodological Reflections and First Steps Toward an Explication

3.1 The Folly to Define Each and Every Concept and Some More Modest and Less Simple-Minded Approaches

In some traditions of philosophy, there are still lingering elusive ideals of concepts, conceptual analysis and definitions. One of these ideals is the idea of a complete analytic definition of each and every concept in terms of absolutely precise necessary and sufficient conditions containing only terms that are more basic and better understood than the definiendum. Thus, e.g., Gottlob Frege and the early Ludwig Wittgenstein adhered to a dogmatic postulate of perfect determinacy of sense. Frege went so far as to claim that a concept without a complete and precise definition is not a genuine concept, but only a pseudo-concept, i.e., strictly speaking, no concept at all (Frege 1893/1903, Vol. II: §§ 56–65).

Lament it or cheer it, ordinary concepts are not like that. The first thing to remember is that what we call definition is a human activity (Robinson 1954: 13) that may serve many different aims and purposes.³ Among the possible purposes are: (definitional) reduction, optimizing exactness of application, avoiding vagueness, clarification, avoiding misunderstanding etc. Different aims call for different conditions of adequacy.

² Cp. Schmitt (ed.) (1994), Haddock/Millar/Pritchard (eds.) (2010) and Goldman/Whitcomb (eds.) (2011). On the history of social epistemology *avant la lettre* see Schmitt/Scholz (2010).

³ Derivatively, the main product of this activity, usually a sentence which expresses a result of these efforts, is also called "definition".

The second thing to note is that not all concepts are born equal. A few concepts may be blessed with precise definitions of the “if and only if”-variety, e.g., “triangle” or “circle” in the terminology of geometry; or, already somewhat more doubtful, “bachelor” in the language of law. Again, some concepts (e.g., “Scandinavian country”, “member of the Vienna Circle”) can be introduced by enumerating what is in their extension. Many concepts can be taught by giving examples and hoping that the learner catches on. Some concepts (“red”) are best explained ostensively. And some concepts may be so fundamental (e.g., “good”) that they cannot be defined in an illuminating way. Anyway, most concepts seem to be “cluster concepts”; the meaning of such a concept is “given by a cluster of properties” (Putnam 1975: 52) or a set of (possibly context-dependent) criteria.

In the light of these and similar insights, philosophers have suggested several ways to relax our ambitions with respect to the characterization of concepts, namely to search for (i) disjunctively necessary conditions only, (ii) conjunctively sufficient conditions only, (iii) symptoms, (iv) single necessary conditions, (v) single sufficient conditions, (vi) family resemblances, or simply (vii) pertinent connections among important concepts (e.g., Strawson 1992: 19–21; Davidson 2005: 20).⁴

3.2 Explication by Symptoms

In this paper, I want to apply and recommend the modest strategies (iii) to (vii), and especially (iii) to search for symptoms of expertise.

The idea of characterizing a concept [F] by searching for symptoms of the presence of F was recommended by Nelson Goodman. Here are some pertinent quotes: “A symptom [of F; my insertion] is neither a necessary nor a sufficient condition for, but merely tends in conjunction with other such symptoms to be present in” F. (Goodman 1968: 252) And, on a later occasion: “In general, a symptom is neither a necessary nor a sufficient condition but rather a feature that we think may, in conjunction with others, make more probable the presence of a given disease or other notable state.” (Goodman 1984: 135) As Goodman emphasizes, it is not even guaranteed (though possible, and perhaps even typical)

⁴ In addition, there is the genealogical approach introduced by Friedrich Nietzsche and Michel Foucault and exemplified in important recent work by Edward Craig and Bernard Williams. Instead of asking “How can concept [F] be analyzed?”, they ask “Why do we have concept [F]?”, “What human needs does concept [F] fulfill?” or “What is the point of concept [F]?” Christian Quast, in his contribution to this issue, takes steps to an application of the genealogical approach to the concept “expertise” (Quast 2016). Closely related to the genealogical approach are “ameliorative” analyses that “begin by asking: What is the point of having the concept in question [...] What concept (if any) would do the work best?” (Haslanger 2012: 367, see also 376, 385f.).

that the symptoms of F are conjunctively sufficient or disjunctively necessary for the presence of F (Goodman 1984: 135). For this reason, discussion of symptoms of F “cannot be carried on in terms of proofs of adequacy and conclusive counterexamples” (Goodman 1984: 135).⁵

3.3 Formal Preliminaries for an Explication

Before I can go on to present a tentative list of symptoms of expertise, we should pause for some more formal questions, especially about the relations of epistemic or cognitive expertise. Here we may take up proposals by the Polish logician Joseph M. Bochenski who developed the fundamentals of a logic of authority.⁶ Quite obviously:

- (1.1) Authority is a relation.
A bit more precisely:
- (1.2) Authority is a *triadic relation* obtaining between a person x who has authority (the bearer of authority), another person y for whom x is an authority (the recognizing subject) and a domain of authority (the field). (Bochenski 1965; idem 1974)
Accordingly, the general formal structure of authority is this:

(A) x is an authority for y in the domain d. For short:
A(x, y, d).

Of fundamental importance is a distinction between two major kinds of authority: (a) *epistemic authority*⁷ and (b) *deontic authority*. To the domain of epistemic authority belong classes of statements or propositions. To the domain of deontic authority rather belong classes of imperatives.

⁵ Goodman introduced this concept of symptom in his discussion of aesthetic experience (Goodman 1968: 252–255; cp. idem 1978: 67–69 and 1984: 135–138). Let me emphasize that, in the present context, I am not interested in Goodman’s application; nor do I want to claim fancy analogies between “aesthetic experience” and “expertise”. Even less should the term “symptom” suggest that expertise is some kind of disease. I am only interested in the notion as a methodological device for characterizing and clarifying the contents of a concept.

⁶ In an Appendix to *The Logic of Religion* (1965), Bochenski first presented a brief introduction to the logic of authority that he later expanded in a paper “An Analysis of Authority” (Bochenski 1974a) and finally in a little book by the title *Was ist Autorität?* (Bochenski 1974b).

⁷ In 1999, Goldman used the general term “authority”, but it is quite clear that he was dealing with *epistemic authority* (Goldman 1999: 267–271). In his 2001 paper, he has made explicit that he is focussing on “cognitive or intellectual experts” and “expertise in the cognitive sense” (Goldman 2001: 91). He contrasts “cognitive expertise” with “skill expertise”, but does not mention “deontic authority (or expertise)”. Weinstein distinguishes between “performative expertise”, i.e., an ability “to perform a skill well”, and “epistemic expertise”, i.e., an ability to offer “strong justifications for a range of propositions in a domain” (Weinstein 1993: 58ff.). The most fine-grained analysis of authority I know of is to be found in the works of Richard T. DeGeorge. (DeGeorge 1970, 1976 and Chapter 3 of the 1985 book focus on *epistemic authority*.)

In what follows, we will mainly deal with experts in the sense of epistemic or cognitive authorities:

(EA) x is an epistemic authority for y in the domain d .
For short: $A_e(x, y, d)$.

If we use “ e ” to refer to the expert and “ l ” to refer to the layperson, we get:

(Exp) e is an expert for l in the domain d . For short:
 $\text{Exp}(e, l, d)$.

3.4 Some History

The important restriction of authority to a certain field or domain d has been emphasized early on. We find it already in Plato: An expert must have a grasp of a well-defined subject matter or art (*Protagoras* 311b–312e; *Sophist* 232b–235a).

Later on, in the tradition of Aristotelian and Ciceronian Topics, the so-called “locus ab auctoritate” was associated with the maxim: “unicuique experto in sua scientia credendum est”, i.e.: any expert is to be believed in his science, as Peter of Spain put it in the thirteenth century (Petrus Hispanus 1972: 76 [my emphasis]). In his *Logica Hamburgensis* (1638), Joachim Jungius (1587–1657) listed among his four maxims for the correct use of testimony: “I. Probato artifice in sua arte credendum est [...]”. (The proven expert is to be believed in his art.) This is the formula which is explained as follows: “hoc est, Peritis in quaque arte, scientia, professione, praesertim si consentiant, fides habenda est”, that is, those who are well versed in some art, science, or profession, should be believed—especially if they should agree with each other (Jungius [1681] 1957: 339). By inserting the clause “praesertim si consentiant” (especially if they should agree with each other), Jungius already alluded to the possibility of rival expert judgments; but the problem was not pursued any further.⁸

3.5 A Difficulty and an Addition

The difficulty consists in appropriately characterizing the domain of expertise. This can be done in a more fine-grained or in a more coarse-grained way. Let us call this difficulty the *Generality Problem for characterizing the domain of expertise*. To illustrate: Often d is characterized by referring to a whole scientific discipline, e.g., physics, chemistry, biology, psychology, history and so on; but, at

least in our days, no one can be a full expert in one of these colossal disciplines. Whether someone is an expert and, if she is, to what degree she is one, depends inter alia on the way you specify the field or domain of expertise.

As to the addition, some modern authors have suggested that expertise is, at the very least, a tetradic relation; they introduce a reference to a class of tasks (Krems 1994: 53; Feltovich et al. 2006: 57).

(Exp+) e is an expert for l in the domain d relative to a class of tasks t . For short: $\text{Exp}(e, l, d, t)$.

3.6 Some Symptoms of Objective Expertise

Let us now turn to the characterization of expertise as regards content. We might begin with simply listing symptomatic conditions of expertise such as: a long experience (in domain d); an extensive fund of knowledge in d ; broad and deep understanding of d , and so on. In what follows I have tried to group the candidate symptoms under four headings:

- (I) *Individual cognitive abilities, achievements, and goods* problem-solving ability; pattern recognition; situational discrimination; experience; possession of accurate information (true beliefs); justified beliefs; coherent beliefs; propositional knowledge; understanding; practical knowledge, knowing-how, skills; tacit knowledge; et cetera.
- (II) *Social relations* testifying that p to a lay public; being a cognitive authority for a lay public; being widely believed to be a cognitive authority by a lay public; agreeing with other putative experts; disagreeing with some other putative experts; et cetera.
- (III) *Modes and degrees* extensive fund; comparatively great quantity; superior level; easy access; effortless use; optimal efficiency in the execution; automatized connections between problem identification and action; with self-monitoring and other control mechanisms; long-lasting, not accidental or singular; et cetera.
- (IV) *Effects and concomitants* success; effectiveness in the results; ability to project her expertise to new questions, problems and tasks in d ; ability to make reliable forecasts; a tendency to agree with other experts in domain d about the pronouncements of her expertise in domain d ; ability to identify other experts in the same domain; pedagogical abilities (given the requisite social competences), e.g., ability to inform l about d , ability to advise l in questions relating to d , ability to explain/give an account of the particular things in d to l , ability to teach her expertise to n ; et cetera.

⁸ For additional references see Schröder (2001): 45–48, 126–129. On the modern use of the French, English and German terms for “expert” and related keywords see Williams ²(1983): 129 and Landwehrmann (1972): 875f.

This is a long and complex list. It is meant to be representative, but not thought to be exhaustive. While most of the symptoms refer to the disposition or propensity element of expertise, others refer to an element of actual achievement and success.

3.7 Going Beyond Symptoms

Now, what can we do with such a higgledy-piggledy list? How might we go beyond an aggregate of symptoms of expertise? Well, there are several methodological options. I want to mention and recommend two options in particular.

- a. *Weighted checklists* In the first place, we might proceed to offer a checklist of symptoms that might help to distinguish between objective expertise and various forms of pretended or counterfeit “expertise”.⁹ To get closer to a measuring device, we may weight the items on our checklist by assigning point values (totalling, say, 100 points) to them. In this way, we provide a rough metric for the expertise scale (cp. Gruenberger 1964: 1414). The scores we assign will be to some extent subjective and arbitrary; but it is, of course, their relative size that matters (Gruenberger 1964: 1415). Furthermore, it will be interesting to compare the (weighted) checklists offered by different people and see whether they tend to converge.
- b. *The ideal expert* Alternatively, one might want to construct an ideal or pure type of expertise in the sense of Max Weber in order to construct theoretical models that might help to explain concrete social phenomena. To the extent that they are compatible with each other, we would combine as many symptoms as possible to construct such a pure type.

Though these two methodological strategies might prove useful, I cannot pursue them any further here. My aims in the present paper are more modest: I recommend my list of symptoms and my tentative classification as an open and flexible conceptual framework for interdisciplinary research and discussion on experts and expertise.

4 A Second Look at Alvin I. Goldman’s Definitions

Against the abstract methodological background sketched above, I want to take up and continue my discussion with Alvin I. Goldman (cp. Scholz 2009; Goldman 2009).

⁹ From a methodological point of view, it might be instructive to compare Fred J. Gruenberger’s attempt to solve a different, but related problem: “How does one distinguish between valid scientific work and counterfeit “science”?” (Gruenberger 1964: 1413). In the following, I am indebted to Gruenberger’s approach.

In his pioneering work on social epistemology *Knowledge in a Social World* (KSW 1999), Goldman suggested the following definition of *objective authority*:

(Official Def. KSW) “Person A is an authority in subject S if and only if A knows more propositions in S, or has a higher degree of knowledge of propositions in S, than almost anybody else.” (Goldman 1999: 268)¹⁰

To be sure, in KSW he already allowed for an expansion to cover potential knowledge, but he did not build it into his official definition.¹¹

In “Experts: Which Ones Should You Trust?” (EWOSYT 2001), he partly supplemented, partly modified his earlier proposal. As he emphasized: “Expertise is not all a matter of possessing accurate information. It includes a capacity or disposition to deploy or exploit this fund of information to form beliefs in true answers to new questions that may be posed in the domain. This arises from some set of skills or techniques that constitute part of what it is to be an expert.” (Goldman 2001: 91) Borrowing a different, but well-established terminology from the Cognitive Sciences, we might say that *expertise is a productive and systematic capacity*, projectible to new and related cases of application. Accordingly in 2001, Goldman offered a different official definition of objective expertise:

(Official Def. EWOSYT) “[...] an expert [...] in domain D is someone who possesses an extensive fund of knowledge (true belief) and a set of skills or methods for apt and successful deployment of this knowledge to new questions in the domain.” (Goldman 2001: 92.)

If we draw together the different threads in these quotations, we get something like the following definition of objective expertise:

(*Expert_{obj} – Truth*) Person A is an expert in domain d if and only if: (1) A has considerably more beliefs in true propositions and/or fewer beliefs in false propositions within d than the vast majority of people do; and (2) A possesses a set of skills and¹² methods

¹⁰ Cf. “[...] experts in a given domain [...] have more beliefs (or high degrees of beliefs) in true propositions and/or fewer beliefs in false propositions within that domain than most people do (or better: than the vast majority of people do).” (Goldman 2001: 91.).

¹¹ In his early discussion of the “problem of *expert identifiability*” in Goldman 1991, he suggested the following definition: “[...] let us define an expert as someone who either (1) *has* true answers to core questions in the domain (i.e., believes or assigns high probability to these answers), or (2) has the *capacity* (usually through the possession of learned methods) to acquire true answers to core questions when they arise.” (Goldman 1991: 129).

¹² My “and” seems more adequate than Goldman’s “or” (cf. Goldman 2001: 92).

for apt and successful deployment of this knowledge to new questions in d.

There are several problems, or at least *prima facie* difficulties, associated with ($Expert_{obj} - Truth$):

From the beginning, Goldman has been aware of an issue of vagueness: His definition contains a lot of vague predicates. This need not be a real difficulty for ($Expert_{obj} - Truth$) because “is an expert” is itself a vague predicate so that Goldman may fairly contend that his definiens accurately and aptly reflects the vagueness of the definiendum.

Nevertheless, there is a special problem with Goldman’s condition “has considerably more beliefs in true propositions and/or fewer beliefs in false propositions within D than the vast majority of people do”: Strictly speaking, there is no way of counting beliefs or propositions, because there is no commonly accepted way of individuating beliefs or propositions. Let us call this difficulty the *Individuation Problem for Beliefs*. As a consequence, confident talk of “having more beliefs than” or “fewer beliefs than” lacks precise content and might therefore suggest a higher degree of exactness than it really bears out. For the sake of discussion, I propose to ignore this grave difficulty and continue to talk as if there were a neat way of counting beliefs or propositions.

Additional difficulties are involved in Goldman’s veritistic or truth-linked approach which manifests itself in his definitions of objective expertise. Goldman’s explications were intended to be purely veritistic, i.e., they were orientated towards one single epistemic desideratum, namely truth. (To be sure, Goldman early on intended to include a second desideratum: the avoidance of errors, i.e., false beliefs.)

Let me emphasize that I am in great sympathy with Goldman’s attacks on veriphobia and epistemic relativism and, particularly, in sympathy with his realism and objectivism about expertise. Nevertheless, I thought and still think that his concentration on true beliefs maybe unduly restrictive and, in some respects, even materially inadequate. In this vein, I brought up the following point for discussion in my 2009 paper:

The *fundamental problem* is this: Whereas the non-expert may only have a few general and coarse opinions about d, the expert will typically entertain thousands of highly special and sophisticated beliefs about d. (Think, e.g., of the early days of astronomy.) Thus, the expert runs a much greater risk to entertain false beliefs than the layperson does. Consequently, the following situation may easily arise: *A non-expert may have more true and fewer false beliefs about d than the expert.* Or, at least, it might happen that *a non-expert may have fewer false beliefs about d than the expert.*¹³

¹³ In “Expertise and Applied Social Epistemology” (in this issue), Goldman himself, without mentioning our earlier discussion, adduces the example of a physician of the eighth century who may quite

In his reply, Goldman rejected the first scenario as not very plausible (Goldman 2009: 276), but accepted the second scenario as a problematic one for a purely veritistic definition and hinted at the option of introducing a justification component into a revised definition although this would dim the prospects of expert identification (Goldman 2009: 275f.). In his new paper “Expertise and Applied Social Epistemology”, Goldman now explores this option, but comes to the conclusion “that we have no reason to back away from a veritistic (or partly veritistic) approach to “expert”” (Goldman 2016, this issue).

As for myself, qualms about a purely veritistic approach, brought me to a different positive *suggestion*: In a full-fledged theory of expertise, all epistemic or cognitive goods, values and desiderata (cp. Alston 2005) should be taken into account: besides truth and other truth-conducive desiderata (such as epistemic justification or theoretical rationality), especially explanatory coherence in a belief system about a domain d and theoretical and practical understanding in a domain d.

To illustrate my proposal, I formulated, inter alia (in addition to a justification and a coherence component), the following condition of objective expertise:

($Expert_{obj} - Understanding$) e is an expert in domain d if: e has a considerably *better understanding* of domain d than the vast majority of people do. (Scholz 2009: 193)

In the remainder of this paper, I want to present and explore a somewhat weaker version of this idea of ($Expert_{obj} - Understanding$), namely the idea that understanding domain d is, if not a necessary condition, at least an important symptom of expertise (in d).

5 Understanding as One Important Symptom of Expertise

5.1 Towards an Account of Understanding

What is it to understand? We have only begun to understand understanding; accordingly, I can only give a rough sketch of an account (cp. Scholz 1999, 2011, 2016).

“To understand” is a transitive verb; understanding needs an object. One understands *something* or *some person*. Sometimes we understand something without effort, simply because we have acquired the requisite ability, and nothing more is needed. Thus, e.g., we understand the linguistic utterance “Piss off!”, since we have learned the

Footnote 13 continued
plausibly be a medical expert in spite of his having “a super-abundance of false medical beliefs” (Goldman 2016).

English language. But, often, understanding requires work; this is revealed in phrases like “trying to understand” or “struggling to understand” (Vendler 1994). When we cannot understand something immediately, we may nevertheless make an effort to understand it.

What kinds of items are possible objects of understanding? Traditional accounts (e.g., in hermeneutics) concentrated on the understanding of texts plus, occasionally, things that were supposed to be sufficiently text-like. From a more systematic point of view, the objects of understanding may be divided into the following classes (cp. Föllesdal 1981: 154f.; Scholz 2016: 20):

- (a) *persons* and collectives of persons;
- (b) intentional *attitudes* of persons, especially their cognitive and conative attitudes;
- (c) individual and collective *actions*;
- (d) certain *products of actions*;
- (e) *situations*; and
- (f) *rules* and rule-constituted social entities (Nemirow 1995).

With regard to subclass (d), i.e., products of actions, it should be emphasized that it encompasses a great variety of items: signs, signals, symbols, words, sentences, texts, arguments, proofs, paintings, maps, diagrams, sculptures, works of architecture, instruments, machines and other artefacts.¹⁴ Common usage and common sense would certainly add one more item to the list, namely:

- (g) *natural phenomena* (i.e., *natural processes, mechanisms and regularities*).

At any rate, scientists and other curious people have always talked about understanding the universe and its many properties, structures and mechanisms (cp. Cooper 1994, 1995; Greco 2014: 287); thus, we want to understand, e.g., what osmosis is and how it works, or why there are black holes and what their typical causes and effects are.

In addition to the direct object constructions, we use other grammatical structures, e.g., “understanding that” (Kvanvig 2003: 189ff.), and, more importantly, indirect question constructions such as “understanding why” or “understanding how” (cp. Bromberger 1962, 1992; von Kutschera 1981, ch. 2; Vendler 1984, 1994). Attempts to understand *x*, say an action, may still aim at answering various different questions about *x*, e.g., what was done, why it was done, for what purpose etc. Thus, attending to the indirect questions that may follow the verb “to understand” provides us with a more fine-grained classification of types of understanding (e.g., “understanding what was done”, “understanding why *x* was done” etc.)

¹⁴ The understanding of languages and, more generally, symbol systems (cp. Goodman 1968) has sometimes been treated as a special case of (d) and sometimes as a special case of (f).

than the focus on the direct object constructions (e.g., “understanding action *x*”).

Let me draw your attention to the interrogative pronouns that go together with „to understand“:

- “why” (e.g., “Historians try to understand *why* President Truman gave the order to drop atomic bombs on Japan”);
- “how” (e.g., “He does not understand *how* a computer works”); and, on occasion,
- “what” (e.g., “It took some time to understand *what* really had happened”);

By contrast, the expressions “understanding when”, “understanding where” or “understanding who”, though not ungrammatical, would require special contexts to make sense.

Let us now compare the verb “to understand” with the kindred verb “to know”. Whereas “to know” takes all kinds of “wh”-clauses as complements (“Lieutenant Columbo knew already *who* killed the chess grand master, *when* and *where*; and now he has also come to know *why* the murderer did it and *how* he did it”), “to understand” typically only takes “why” and “how” (and sometimes “what”) (Vendler 1972: 94, 1984: 203f., 1994: 13). What might be the rationale behind this grammatical difference? Whereas *knowing* also takes simple objects, places and times, *understanding* typically refers to more complex and more involved phenomena. While it is quite possible to know single isolated items, understanding is directed towards complex relations, structures and patterns. In other words, understanding is *more holistic* than knowing (Kvanvig 2003: 192; Greco 2014: 287, 292; Scholz 2016).

Is there something that all objects of understanding have in common? A plausible though still rather vague suggestion is that they all have *structure* (cp. Ziff 1972: 19; Moravcsik 1979: 201; Föllesdal 1981: 155; Rosenberg 1981: 30f.). A bit more precisely, understanding in all cases involves cognition of internal or external relations and interconnections. To use, Jane R. Martin’s apt phrase: understanding is “seeing connections” (Martin 1970: 143–167).¹⁵ Of special importance among these are causal connections, but also logical relations (as in understanding a proof or an argument), means-end relations (as in understanding actions and artefacts), nomological relations (as in understanding events and processes) and convention-based relations (as, e.g., in understanding institutions) (cp. Scholz 2016).¹⁶

¹⁵ To be sure, as Martin is well aware (Martin 1970: 163f.), the emphasis on “connections” is more apt than the metaphorical use of “seeing” that might, misleadingly, suggest mysterious acts of nonphysical perception or fancy flashes of insight.

¹⁶ Kim (1994) and Greco (2014) have emphasized the special importance of dependence relations. I agree that they are vitally important, but I do not want to restrict the general theory of explanation and understanding to the special case of grasping dependence relations.

Here is a tentative list of relations and connections that may become relevant for different kinds of understanding¹⁷:

Formal connections

- Logical relations (p entails q; p is consistent with q; etc.).
- Non-logical formal relations
 - mereological relations (x is part of y),
 - set-theoretic relations (x is element of S; y is a subset of S),
 - other mathematical relations (e.g., topological relations).

Real natural connections

- empirical correlations (x and y are positively correlated),
- lawlike connections; nomic patterns (xs regularly lead to ys),
- causal relationships (x is the/a cause of y),
- supervenience relations (y supervenes on x),
- means-ends-relationships (x is a means to realize y),
- natural sign-relations (x is a natural sign of y).

Real socially constituted relationships

- conventional sign-relations (x refers to y),
- institutional relationships (x counts as y in group G and context C).

5.2 Dimensions of Better Understanding

In addition, we may distinguish two dimensions of having a better understanding of a domain d:

- (a) the *breadth or width* of understanding having to do with the extension of the items in d that we understand; and
- (b) the *depth* of understanding having to do with understanding *why* things are as they are in d and *how* (and by which mechanisms) they behave and develop (in contrast with just understanding *that* something is going on in d).

Though this is, admittedly, abstract and vague, it might help to shed light on the contrast mentioned above between generalists and specialists. Whereas generalists seek width of understanding (typically at the cost of depth), specialists

strive for depth of understanding (typically at the cost of width).

6 Consequences and Prospects

The vagueness of the terms “expertise” and “expert” has been lamented, time and again, in the literature on our complex topic. In his new paper, Goldman adds that “expert” is also a “fluid” term and suggests “that it is plausible that “expert” is such a fluid term that different criteria for it are used in different contexts” (Goldman 2016, this issue).

To my mind, the symptom approach sketched in the first part of my paper offers a methodology that is able to take into account and do justice to the vagueness, fluidity and context sensitivity of our vocabulary for experts and laypersons. In the second part, I have begun to explore one strand in a symptom or multiple criteria approach to expertise, namely an analysis of understanding. This might contribute to (1) more adequate partial explications of “cognitive authority”, “expertise” and “expert” in an objective sense and (2) more complete lists of sources, methods and strategies which may help to identify and assess experts. It also reminds us that there is no algorithm for performing these tasks.

Instead of stubbornly searching for strict definitions for expertise and algorithmic methods for identifying experts, we should, in an interdisciplinary endeavour, investigate all the potential symptoms of expertise and their many inter-relations. If I am right, understanding will be especially central and important.

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References

- Alston WP (2005) Beyond “justification”. Dimensions of Epistemic Evaluation, Ithaca
- Bochenski IM (1965) The logic of religion. New York University Press, New York
- Bochenski IM (1974a) An analysis of authority. In: Frederick J, Adelman SJ (eds) Authority. Chestnut Hill and The, Hague, pp 56–85
- Bochenski IM (1974b) Was ist Autorität? Freiburg; reprinted in: idem, 1988, Autorität, Freiheit, Glaube. Sozialphilosophische Studien, Munich, pp 9–106
- Bromberger S (1962) An approach to explanation. In: Butler, RJ (ed.) Analytical philosophy - second series. Blackwell, Oxford, pp 72–105

¹⁷ Cp. the (incomplete) lists in Martin (1970: 156), Vendler (1994: 16), Kim (1994: 67f.), Franklin (1995: 13f.), Greco (2014: 291). Mantzavinos restricts his discussion to “causal nexuses” and “nexuses of meaning” (Mantzavinos 2005: 73–76, 88–94).

- Bromberger S (1992) On what we know we don't know. Explanation, theory, linguistics, and how questions shape them. The University of Chicago Press, Chicago
- Coady D (2012) What to believe now: applying epistemology to current issues. Wiley-Blackwell, Malden
- Cooper N (1994) Understanding. In: Proceedings of the aristotelian society, suppl. vol 68, pp 1–26
- Cooper N (1995) The epistemology of understanding. *Inquiry* 38:205–215
- Davidson D (2005) Truth, language, and history. Oxford University Press, Oxford
- DeGeorge RT (1970) The function and limits of epistemic authority. In: *The Southern Journal of Philosophy* VIII, pp 199–204
- DeGeorge RT (1976) The function and limits of epistemic authority. In: Harris, RB (ed) *Authority: a philosophical analysis*. University of Alabama Press, Alabama, pp 76–93
- DeGeorge RT (1985) The nature and limits of authority. University Press of Kansas, Lawrence
- Feltovich PJ, Prietula MJ, Ericsson KA (2006) Studies of expertise from psychological perspectives. In: Ericsson KA, Charness N, Feltovich PJ et al (eds) *The cambridge handbook of expertise and expert performance*. Cambridge University Press, Cambridge, pp 41–67
- Føllesdal D (1981) Understanding and rationality. In: Parret H, Bouveresse J (eds) *Meaning and understanding*. de Gruyter, Berlin, pp 154–168
- Franklin RL (1995) *The search for understanding*. Peter Lang, New York
- Frege G (1893/1903) *Grundgesetze der Arithmetik*. Verlag Hermann Pohle, Jena
- Gelfert A (2014) *A critical introduction to testimony*. Bloomsbury, London
- Goldman AI (1991) Epistemic paternalism: communication control in law and society. *J Philos* 88:113–131
- Goldman AI (1999) *Knowledge in a social world*. Clarendon Press, Oxford
- Goldman AI (2001) Experts: which ones should you trust? In: *Philosophy and phenomenological research* 63, pp 85–110; reprinted in: Goldman (2002a) pp 139–163, and in: Selinger/Crease (eds) (2006) pp 14–38
- Goldman AI (2009) Replies to discussants. In: G Schurz, M Werning (eds) *Reliable knowledge and social epistemology. The philosophy of Alvin I. Goldman (=Grazer Philosophische Studien 79)*. Rodopi, Amsterdam, pp 245–288
- Goldman AI (2016) Expertise. Topoi. doi:[10.1007/s11245-016-9410-3](https://doi.org/10.1007/s11245-016-9410-3)
- Goldman AI, Whitcomb D (eds) (2011) *Social epistemology: essential readings*. Oxford University Press, Oxford
- Goodman N (1968) *Languages of art*, 2nd edn, 1976. Hackett, Indianapolis
- Goodman N (1978) *Ways of worldmaking*. Hackett, Indianapolis
- Goodman N (1984) *Of mind and other matters*. Harvard University Press, Cambridge
- Greco J (2014) Episteme: knowledge and understanding. In: Timpe K, Boyd CA (eds) 2014. *Virtues and their vices*, Oxford, pp 285–302
- Gruenberger FJ (1964) A measure for crackpots. *Science* 145:1413–1415
- Haddock A, Millar A, Pritchard D (eds) (2010) *Social epistemology*. Oxford University Press, Oxford
- Hardwig J (1985) Epistemic dependence. *J Philos* 82:335–349
- Haslanger S (2012) *Resisting reality: social construction and social critique*. Oxford University Press, Oxford
- Jungius J (1681) *Logica Hamburgensis*. In: Vagetus J (ed), Hamburg (Reprint in RW Meyer (ed), Hamburg 1957)
- Kim J (1994) Explanatory knowledge and metaphysical dependence. *Philos Issues* 5:51–69
- Krems JF (1994) *Wissensbasierte Urteilsbildung: Diagnostisches Problemlösen durch Experten und Expertensysteme*. Verlag Hans Huber, Bern
- Kvanvig JL (2003) *The value of knowledge and the pursuit of understanding*. Cambridge University Press, Cambridge
- Landwehrmann F (1972) Experte. In: Ritter, J, Gründer, K (eds) *Historisches Wörterbuch der Philosophie*, vol 2. Schwabe & Co., Basel coll. 875–876
- Mantzavinos C (2005) *Naturalistic hermeneutics*. Cambridge University Press, Cambridge
- Martin JR (1970) *Explaining, understanding and teaching*. McGraw-Hill Book Company, New York
- Moravcsik Julius ME (1979) Understanding. *Dialectica* 33:201–216
- Nemirow LE (1995) Understanding rules. *J Philos* 92:28–43
- Petrus Hispanus [Peter of Spain] (1972) *Tractatus (Summulae logicales)*. In: de Rijk LM (ed) Assen. Van Gorcum
- Putnam H (1975) *Mind, language and reality (philosophical papers, volume 2)*. Cambridge University Press, Cambridge
- Quast C (2016) Expertise: a practical explication. *Topoi*. doi:[10.1007/s11245-016-9411-2](https://doi.org/10.1007/s11245-016-9411-2)
- Robinson R (1954) *Definition*. Clarendon, Oxford
- Rosenberg JF (1981) On understanding the difficulty in understanding understanding. In: Parret H, Bouveresse J (eds) *Meaning and understanding*. de Gruyter, Berlin, pp 29–43
- Schmitt FF (ed) (1994) *Socializing epistemology: the social dimensions of knowledge*. Rowman & Littlefield, Lanham
- Schmitt FF, Scholz OR (2010) Introduction: the history of social epistemology. *Episteme* 7:1–6
- Scholz OR (1999) *Verstehen und Rationalität*, Frankfurt am Main: Klostermann (3rd, enlarged edition 2016)
- Scholz OR (2009) Experts: what they are and how we recognize them—a discussion of Alvin Goldman's views. In: Schurz G, Werning M (eds) *Reliable knowledge and social epistemology. The Philosophy of Alvin I. Goldman (=Grazer Philosophische Studien 79)*. Rodopi, Amsterdam, pp 187–205
- Scholz OR (2011) Verstehen verstehen. In: Helmerich M, Lengnick K, Nickel G, Rathgeb M (eds) *Mathematik verstehen. Philosophische und didaktische Perspektiven*. Vieweg + Teubner, Wiesbaden, pp 3–14
- Scholz OR (2016) Verstehen = Zusammenhänge erkennen. In: Sachs-Hombach K (ed) *Verstehen und Verständigung*. Herbert von Halem, Köln, pp 17–32
- Schröder J (2001) *Recht als Wissenschaft. Geschichte der juristischen Methode vom Humanismus bis zur Historischen Schule*. C.H. Beck, Munich
- Selinger E, Crease RP (eds) (2006) *The philosophy of expertise*. Columbia University Press, New York
- Strawson PF (1992) *Analysis and metaphysics: an introduction to philosophy*. Oxford University Press, Oxford
- Vendler Z (1972) *Res cogitans: an essay in rational psychology*. Cornell University Press, Ithaca
- Vendler Z (1984) Understanding people. In: Shweder RA, LeVine RA (eds) *Culture theory*. Cambridge University Press, Cambridge, pp 200–213
- Vendler Z (1994) Understanding misunderstanding. In: Jamieson D (ed) *Language, mind and art. Essays in appreciation and analysis, in Honor of Paul Ziff*. Reidel, Dordrecht, pp 9–21
- von Kutschera F (1981) *Grundfragen der Erkenntnistheorie*. de Gruyter, Berlin
- Weinstein BD (1993) What is an expert? *Theor Med* 14:57–73
- Williams R (1983) *Keywords: a vocabulary of culture and society*, revised edition. Oxford University Press, New York
- Ziff P (1972) *Understanding understanding*. Cornell University Press, Ithaca