



Beyond intuitive know-how

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Abstract

According to Dreyfusian anti-intellectualism, know-how or expertise cannot be explained in terms of know-that and its cognates but only in terms of intuition. Hubert Dreyfus and Stuart Dreyfus do not exclude know-that and its cognates in explaining skilled action. However, they think that know-that and its cognates (such as calculative deliberation and perspectival deliberation) only operate either below or above the level of expertise. In agreement with some critics of Dreyfus and Dreyfus, in this paper, I argue that know-that and its cognates are constitutive of rather than external to know-how and expertise. However, unlike those critics, who argue for this point only from a phenomenological point of view, my argument adopts a (telic) normative point of view.

Keywords Intuition · Skill · Expertise · Success-conduciveness · Hubert and Stuart Dreyfus

1 Intuitive know-how introduced

When an agent S ϕ s skillfully, we attribute know-how to S by asserting that “ S knows how to ϕ ”. The notion of know-how is used to explain skilled or intelligent actions. However, what is know-how? According to Dreyfusian anti-intellectualism, know-how cannot be explained in terms of know-that but only in terms of intuition. Concerning the negative thesis that know-how is not know-that, Hubert Dreyfus and Stuart Dreyfus maintain the following:

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You can ride a bicycle because you possess something called “know-how”, which you acquired from practice and sometimes painful experience. The fact that you can’t put what you have learned into words means that know-how is not accessible to you in the form of facts and rules. ... All of us know how to do innumerable things that, like bike riding, cannot be reduced to “knowing that”. (Dreyfus & Dreyfus, 1986: 16)

Concerning the positive thesis that know-how is intuition, they make the following claim:

When we speak of intuition or know-how, we are referring to the understanding that effortlessly occurs upon seeing similarities with previous experiences. We shall use “intuition” and “know-how” as synonymous, although a dictionary would distinguish them, assigning “intuition” to purely cognitive activities and “know-how” to the fluid performance of a bodily skill. (Dreyfus & Dreyfus, 1986: 28)

Although Dreyfus and Dreyfus intend to use the terms “intuition”¹ and “know-how” as synonymous, they also use the former to modify the latter. They claim that “*intuitive know-how* transcends the beginner’s calculation of decisions” (1986: 182; emphasis mine). Stuart Dreyfus claims that “[e]xperienced cooks ... often find it difficult ... to decompose their situational awareness and *intuitive know-how* into a series of discrete steps for a novice or advanced beginner to follow” (Rousse & Dreyfus, 2021: 8; emphasis mine). In this paper, I use the term “intuitive know-how” to highlight the intuitive character of know-how.

Does Dreyfus and Dreyfus’s notion of intuitive know-how *adequately* explain skilled action? To frame the question more specifically, does the notion of know-that and its cognates—such as “self-reflective thinking, planning, predicting, deliberation, attention to or monitoring of ... actions, conceptualizing ... actions, control, trying, effort, having a sense of the self, and acting for a reason” (Montero, 2016)—really play no role in skilled action? Under most scholars’ interpretation of Dreyfus’s view of know-how and expertise, know-that and its cognates have no role in skilled action. However, for Dreyfus, “a number of critics of [the Dreyfus] skill model over recent years...drawing narrowly and selectively on the published record, have purveyed a caricatured version of it” (Rousse & Dreyfus, 2021: 18–19), and “it is a straw man constructed from a narrow and distorting reading of our work” (Dreyfus & Rousse, 2018: 182).

¹ As Lisa Osbeck and Barbara Held observe, “there is no single sense of ‘intuition’ in play in contemporary scholarship, let alone across historical and philosophical contexts. ... Intuition is variably identified as a process ..., a product ..., a foundation or precondition for knowledge, and a method for obtaining it” Osbeck & Held 2014a: 3). That said, if we follow Paul Bloomfield’s distinction between “a priori intuitions” (e.g., “knowledge that is the result of something like pure rational thought and is, in any case, not based on empirical experience or learning” [Bloomfield 2001: 66]) and “a posteriori intuitions”, we find that Dreyfus and Dreyfus’s notion of intuition belongs to the latter class. I thank an anonymous reviewer for drawing my attention to this point. For a useful book on philosophical conceptions of intuition (such as those of Aristotle, Descartes, Spinoza, Kant, Husserl, and Bergson), see Osbeck & Held (2014b).

In the non-caricatured version of their view, Dreyfus and Dreyfus do not exclude know-that and its cognates in explaining skilled action. However, they think that know-that and its cognates (such as, using Dreyfus's terminology, calculative deliberation and perspectival deliberation) only operate either below or above the level of expertise. In agreement with some critics of Dreyfus and Dreyfus (e.g., Christensen et al., 2016; Montero, 2016; Toner et al., 2022), in this paper, I argue that know-that and its cognates are constitutive of rather than external to know-how and expertise. However, unlike those critics, who argue for this point only from a phenomenological point of view, my argument adopts a normative point of view.

In Sects. 2 and 3, I present a non-caricatured version of Dreyfus and Dreyfus's view of intuitive know-how and expertise in a question-and-response format. In Sect. 4, I show how Dreyfus and Dreyfus can treat know-that and its cognates as external to know-how and expertise by employing what I call the *swamping defense*. In Sect. 5, I explain how it is possible for know-that and its cognates to make a substantial positive contribution to performance from a normative point of view.

2 Intuitive know-how questioned

The notion of intuitive know-how must be unpacked. The notion of know-how imposes a constraint on any adequate notion of intuition that is embedded or embodied in intuitive know-how. If it is to be a fundamental component or dimension of know-how, intuition must be able to account for the fact that know-how is success-conducive, i.e., that one's knowing how to ϕ , when exercised, is conducive to success with respect to achieving the goal of ϕ . Not all intuitions satisfy this constraint. Novice intuition and biased intuition² do not meet this constraint, whereas expert intuition does.

The question that thus arises is as follows: What does expert intuition consist in, so as to render it success-conducive? Answers to this question, however, differ. Although there is a large body of literature concerning expert intuition, cognitive psychologist Fernand Gobet tells us that “[c]urrent theories of expert intuition can be classified into two main headings: mechanistic and non-mechanistic theories” (Gobet 2016: 98). Mechanistic theorists (e.g., Chassy & Gobet 2011; Klein, 2003; Simon, 1995) endorse the view that expert intuition consists in information-processing mechanism in which chunks, templates, and pattern recognition play key roles. In contrast, non-mechanistic theorists endorse the view that expert intuition consists in something beyond information-processing mechanism, such as embodiment and situation. According to Gobet, “Dreyfus and Dreyfus reject the sort of mechanistic explanations proposed by Simon and, instead, use phenomenology for explaining intuition” (Gobet 2016: 99). But for Gobet, Dreyfus and Dreyfus's phenomenology of intuition has several weaknesses, such as “the lack of detailed mechanisms” of expert intuition, and the “neglect of the analytical aspects of expertise (e.g. search, planning)” (Gobet 2016: 100). Gobet concludes, “[i]n sum, [Dreyfus and Dreyfus's] theory is too simple to account for experts' intuition” (Gobet 2016: 100).

² With regard to biased intuition, see Kahneman & Klein (2009) for a critical review.

Gobet does not say that Dreyfus and Dreyfus's theory of expert intuition is mistaken; rather, it is weak. However, Dreyfus and Dreyfus did address the issues that Gobet raises. In what follows I will show how Dreyfus and Dreyfus address the issue of the mechanisms of intuition and that of the relation between intuition and analysis (and its cognates) by explaining how expert intuition can be success-conducive, and how success-conducive expert intuition can be.

3 Intuitive know-how clarified

3.1 The basis of intuitive know-how

What is it that makes expert intuition success-conducive? With regard to this question, there seems to be three possible levels of investigation: “(a) the phenomenological level investigated by phenomenologists and gestalt psychologists; (b) the information-processing level investigated by rationalist philosophers, cognitive psychologists, and decision theorists; and (c) the brain level studied by neuroscience” (Dreyfus, 1997: 26). As mentioned above, mechanistic theorists focus on the information-processing mechanism.

However, for Dreyfus and Dreyfus, the information-processing level should be wiped out. According to them, the central ideas proposed and studied at this level, such as pattern recognition, recognition-primed decision-making, skilled memory, schemata, and System 1, have something in common: “There are no doubt other causal explanations in the intuition literature but as far as I know they all involve what is termed an associative process involving trains of thoughts that are all memories of, or abstractions from, past experience. These are stored in what is called *declarative* memory; the memory ... associated with the brain's hippocampal and diencephalic systems” (Dreyfus, 2014: 16). But for Dreyfus and Dreyfus, intuitive know-how or expertise does not consist in the declarative memory system, but the procedural memory system:

Neuroscientists over 30 years ago identified an entirely different brain system than the associative System 1 and showed as convincingly as is possible given current brain research technology that it explains experientially-learned *knowing how* to successfully respond to familiar situations, i.e., intuitive expertise. What neuroscientists have identified is called *procedural* memory, a type of nondeclarative memory. (Dreyfus, 2014: 17)

To produce skilled action, the procedural memory system does not “remember *separately* processed experiences” but “depends upon *synaptic changes* in areas of the brain different from those producing declarative memory; changes cumulatively brought about by the *totality* of previous relevant experiences” (Dreyfus, 2014: 17; emphases original).

In fact, Dreyfus and Dreyfus's neural network explanation of what it is that makes expert intuition success-conducive was proposed in 1988, two years after the publication of their *Mind Over Machine*. In the Preface of the paperback edition of *Mind*

Over Machine, Dreyfus and Dreyfus note that “[t]he neural-network research gave us a new way to think about the [expertise] phenomenon. According to the neural-network model, memories of specific situations are not what is stored. Rather, the connections between neurons are modified by successful behavior in such a way that the same or similar input will produce the same or similar output” (Dreyfus and Dreyfus 1988: xii).

It is now obvious not only that Dreyfus and Dreyfus did address the issue of the (neurobiological) mechanism underlying expert intuition, but also why they rejected the (information-processing) mechanistic explanations. In fact, Dreyfus (2014) also uses the distinction between the declarative memory system and the procedural memory system to support anti-intellectualism about know-how (although this strategy is not new and has recently been challenged; see Christensen et al., 2019, De Brigard, 2019, and Schwartz & Drayson 2019 for discussion). At any rate, overall, we can see that Dreyfus and Dreyfus offer a unified account of skilled action in which, at the phenomenological level, skilled action is explained in terms of *intuitive* know-how rather than *deliberative* know-that, and at the neurobiological level, skilled action is explained in terms of *procedural* know-how rather than *declarative* know-that.

3.2 The limit of intuitive know-how

The question that thus arises is as follows: How success-conducive can expert intuition be? With regard to this question, Dreyfus and Dreyfus answer in the following way: “*When things are proceeding normally, experts don’t solve problems and don’t make decisions; they do what normally works*” (Dreyfus & Dreyfus, 1986: 30–1, italics in original). That is, for Dreyfus and Dreyfus, there is no guarantee that expert intuition can *always* work well; expert intuition works well only within the range of *normal* conditions. When an expert is situated outside the range of normal conditions, she either has no developed intuitions, or if she has such intuitions, they require further examination. Regardless of which alternative obtains, when intuitive know-how breaks down, know-that or its cognates become relevant. Dreyfus and Dreyfus point out that “[a]lthough intuition is the final fruit of skill acquisition, *analytic thinking* is necessary for beginners learning a new skill. It is also useful at the highest levels of expertise, where it can sharpen and clarify intuitive insights” (Dreyfus & Dreyfus, 1986: xiv; emphasis mine). That is, know-that and its cognates can be necessary or useful for skill acquisition or exercise. Stuart Dreyfus thinks that the claim that experts can and do deliberate is too obvious to be worth making: “While the expert is capable of deliberation-free action solicited through an intuitive perspective, situations are bound to arise in which experts do engage in deliberation. Becoming an expert does not mean that the performer will only perform at the expert level from then on. This point would count under the heading of ‘needless to say’” (Rousse & Dreyfus, 2021: 18).

Although Dreyfus and Dreyfus admit that experts can and do deliberate, we should note that they do not believe that such deliberation occurs at the level of expertise. To make this point clearer, let us examine their stage-based model of skill acquisition. In *Mind Over Machine*, Dreyfus and Dreyfus propose a five-stage model of skill acquisition, according to which an individual learning a skill progresses through

five stages: novice, advanced beginner, competence, proficiency, and expertise. In their later writings (Dreyfus 2001; Dreyfus and Dreyfus 2008; Dreyfus 2017; Rouse & Dreyfus 2021), they add a sixth stage: mastery. For Dreyfus and Dreyfus, deliberation does not occur at the level of expertise but only at the level either below or above it. For Dreyfus and Dreyfus, rationality or deliberation exercised below the level of expertise is called “calculative rationality” or “calculative deliberation”: “In calculative deliberation, the performer, lacking an intuitive perspective on the situation, reverts to general rules or situational maxims for guidance on how to proceed” (Rouse & Dreyfus, 2021: 22). Furthermore, rationality or deliberation exercised above the level of expertise is called “deliberative rationality” or “perspectival deliberation”:³ “In perspectival deliberation, the expert performer already perceives the situation in light of an intuitive perspective that occurs to her on the basis of past experience. ... [H]ere the deliberation involves testing limits, imagining alternatives, or seeking to improve the intuitive perspective that has occurred to the performer” (Rouse & Dreyfus, 2021: 22). Neither calculative nor perspectival deliberation is exercised at the level of expertise, in which “experts never think and are always right” (Dreyfus & Dreyfus, 1986: 31).

In conclusion, we have now seen not only that Dreyfus and Dreyfus did address the issue of the relation between intuition and analysis (in particular, deliberation) but also how success-conducive expert intuition can be.

4 Intuitive know-how revisited

The clarified notion of intuitive know-how shows us, first, how intuitive know-how can be success-conducive (i.e., by the procedural system). Second, it explicates the conditions under which intuitive know-how can be success-conducive (i.e., only under normal conditions). Third, in a similar vein, it emphasizes the fact that know-that can contribute to skilled action. Now, can this clarified notion of intuitive know-how be defended from criticism?

I think that Dreyfus and Dreyfus have not yet fully responded to their critics. The main question with which those critics are concerned is not merely that of whether know-that can make a substantial contribution to skilled action *in general* but the question of whether know-that can make a substantial contribution to skilled action *at the level of expertise* (let us call skilled action at the level of expertise “*expert skilled action*” for short).

According to Christensen et al., (2016), “[t]he skill theory presented by Dreyfus & Dreyfus (1986) is the clearest example of an *Automatic* account”, according to

³ According to Rouse and Dreyfus, “[t]here is another kind of deliberation in action that can transpire in the service of expert performance. Dreyfus and Dreyfus [1986] refer to this as ‘deliberative rationality’, though we now offer ‘perspectival deliberation’ as a more fitting label” (Rouse & Dreyfus, 2021: 22). The label “deliberative rationality” might mislead the reader into thinking that deliberative rationality is a genuine kind of rationality; in fact, it is neither rational nor irrational. For Dreyfus and Dreyfus, “[a] vast area exists between irrational and rational that might be called *arational*. ... *Competent performance is rational; proficiency is transitional; experts act arationally*” (Dreyfus & Dreyfus, 1986: 36; emphases original).

which “cognitive control reduces during skill learning and makes no positive contribution to performance with the attainment of advanced skill” (Christensen et al., 2016: 41). In comparison with *Automatic* accounts, Christensen et al. advocate a *Hybrid* account, according to which “cognitive control reduces during skill learning as automatic control comes to play an increasing role, but *cognitive control continues to make a substantial positive contribution at advanced levels of skill*” (Christensen et al., 2016: 41; emphasis mine). In particular, they endorse a special kind of *Hybrid* account, which they call *Mesh*:

Mesh sees a broadly hierarchical division of control responsibilities, with cognitive control usually focused on strategic aspects of performance and automatic processes more concerned with implementation. ... *Mesh* proposes that controlled and automatic processes are closely integrated in skilled action, and that cognitive control directly influences motor execution in many cases. (Christensen et al., 2016: 43)

As Montero, another critic of Dreyfus and Dreyfus, notes, the fact “[t]hat high-level standard chess players employ both intuitive and slow-thinking processes is uncontroversial; even Dreyfus accepts this” (Montero, 2019: 378). As she continues, “[w]hat is controversial is the relative importance of conscious deliberation compared to intuitive choice ... Here, Dreyfus upholds the extreme view that slow thinking, when it occurs in high-level, standard time-control chess, provides assurance that one’s intuitively generated choice is optimal, but it rarely leads to better moves” (Montero, 2019: 378–379). In contrast, Montero endorses what she calls the cognition-in-action principle:

Cognition-in-action: For experts, when all is going well, optimal or near optimal performance frequently employs some of the following conscious mental processes: self-reflective thinking, planning, predicting, deliberation, attention to or monitoring of their actions, conceptualizing their actions, control, trying, effort, having a sense of the self, and acting for a reason. Moreover, such mental processes do not necessarily or even generally interfere with expert performance, and should not generally be avoided by experts. (Montero, 2016: 38)

Christensen et al. and Montero draw on empirical evidence and phenomenological description to support their view of expert skilled action. At core, their real objection to Dreyfus and Dreyfus’s notion of intuitive know-how is that know-that and its cognates (such as the cognitive or mental processes expressed in *Mesh* and cognition-in-action) can make a substantial contribution to *expert* skilled action.⁴

Although Dreyfus and Dreyfus have not responded to this objection directly, I think that two possible responses are available to them. First, Dreyfus and Dreyfus can say that the “expert skilled actions” that their critics offer and examine are not *genuine* expert skilled actions. For Dreyfus and Dreyfus, these *alleged* “expert skilled actions” should be clarified and understood as skilled actions taking place either at

⁴ For similar lines of thought, see Breivik (2007) and Høffding (2014, 2018).

the level of competence or at the level of mastery (since they involve either calculative deliberation or perspectival deliberation) rather than at the level of expertise.⁵ Second, critics of Dreyfus do not claim that expert skilled action *necessarily* involves know-that; thus, there is still room for expert skilled action without involving know-that. Both responses show that the idea of intuitive know-how can be maintained within the Dreyfusian framework.

The thought underlying the responses can be expressed in terms of what I call the *swamping defense* of intuitive know-how. Once critics do not deny the (logical) possibility of intuitive know-how, Dreyfus and Dreyfus are in an advantageous position with respect to defending the claim that know-that and its cognates (e.g., reason or control) are external to know-how. In contrast to their critics, who believe that know-that and its cognates make a substantial contribution to *expert* skilled action, Dreyfus and Dreyfus maintain that “phenomenology suggests that, although many forms of expertise pass through a stage in which one needs reasons to guide action, after much involved experience, the learner develops a way of coping in which reasons play no role” (Dreyfus, 2005: 112). When an expert’s intuitive know-how functions well and when her expert skilled action is successfully produced by exercising such know-how, why should the expert exercise her deliberative know-that? What additional value can such deliberative know-that add to the expert’s successfully performed expert skilled action? According to Dreyfus and Dreyfus, deliberative know-that is required only when an expert is confronted with *abnormal* conditions in which her intuitive know-how cannot function properly. Certainly, an expert can exercise her deliberative know-that when confronted with *normal* conditions in which her expert skilled action can be produced successfully merely by exercising her intuitive know-how. However, in such a case, the expert’s deliberative know-that is functionally superfluous to her successfully performed expert skilled action. This point resonates with the claims of Montero: “Dreyfus upholds the extreme view that slow thinking, when it occurs in high-level, standard time-control chess, provides assurance that one’s intuitively generated choice is optimal, but *it rarely leads to better moves*” (Montero, 2019: 378–379; emphasis mine). The swamping defense, in brief, maintains that the value of *sheer* expert skilled action, which is produced merely by exercising intuitive know-how, *swamps* the value of *deliberative* expert skilled action, which is produced by an additional exercise of deliberative know-that.

5 From success to achievement

The swamping defense, however, makes an assumption that deserves further consideration. It assumes that *success* is the only (or the most fundamental) value of performance or that we value only the attainment of successful performance. From this perspective, intuitive know-how (as exercised in normal conditions) is valuable

⁵ What happens when experts deliberate? From the Dreyfusian perspective, “even though experts immersed in typical situations are capable of deliberation-free, intuitive action, they are bound to encounter situations that are atypical or sufficiently novel to upset that action. When they do, they will be drawn to engage in some form of deliberation, either calculative or perspectival, *even though this may amount to a regression in their current performance*” (Rousse & Dreyfus, 2021: 26; emphasis mine).

because it is a means to successful performance. Deliberative know-that (as exercised in normal conditions) is of little or no value because it adds nothing more to a performance that has been or can be produced successfully merely by exercising intuitive know-how. In my view, critics of Dreyfus and Dreyfus also implicitly adopt this assumption, since what they try to show is that know-that or its cognates (such as control or deliberation) make a performance *successful*. For critics, know-that and its cognates are merely instrumentally valuable.

The intuitive account of performance assessment discussed above can be contrasted with a more sophisticated account of performance assessment, in which even if only one fundamental value of performance is relevant, that value is not mere success but rather a sort of *achievement*. Real achievement is better than mere success because the latter can come from luck, while the former does not and cannot emerge in this way. This more sophisticated account of performance assessment can help us see how it is possible for know-that and its cognates to make a substantial positive contribution to performance that is nevertheless produced by an exercise of intuitive know-how. In what follows, let us consider Ernest Sosa's AAA account of performance assessment (Sosa, 2007, 2011, 2015, 2017, 2021), which is used both in the particular context of Gettier-type cases (i.e., to exclude as cases of *knowledge* those in which a belief is true because of sheer luck) and in general (i.e., to exclude as cases of *creditable performance* those in which a performance is successful because of sheer luck).

According to Sosa, any performance with a constitutive aim can be evaluated by reference to three distinct aspects: *accuracy* (i.e., whether it succeeds in its aim), *adroitness* (i.e., whether it manifests relevant competence), and *aptness* (i.e., whether it is accurate *because* adroit, or whether it is successful *because* competent). Sosa uses archery as an example to illustrate these concepts and the (absent or negative) relations among them. A shot with a target can be accurate (by luck) without being adroit, adroit without being accurate, or both accurate and adroit without being apt. The first two relations are conceivable and understandable, but the third relation requires us to exercise some imagination:

But even a shot that is both accurate and adroit might still underperform. An arrow adroitly released from a bow may be headed straight to the bullseye when a gust diverts it so that it would now miss the target narrowly, except that a second gust eases it back on course. The archer succeeds in that attempt to hit the target, and the shot is also competent, as the arrow leaves the bow perfectly directed and with the right speed. But the shot is accurate because of the lucky second gust, with a distinctive luck that repels competence. It does not manifest the competence required for the success to be creditable to the agent, not even partially (as when the agent joins with others in a collective success). (Sosa, 2021: 18)

Achievement is related to but different from success because it “requires success that is *apt*: through competence rather than luck” (Sosa, 2021: 18).

The AAA account of performance assessment reveals that any one of these three factors—success, competence, and aptness—can make a contribution to perfor-

mance. Success is not the only value of performance. Furthermore, success is not the most fundamental value of *creditable* performance, or performance as *achievement*, which requires success because of competence rather than luck. However, what has been said above has not yet totally undermined the swamping defense. The swamping defense can be modified by saying that the value of *apt* action, which is produced solely by relevant intuitive know-how, swamps the value of *deliberative* apt action, which is produced by additional deliberative know-that.

However, Sosa's AAA account has more to say. There are two further varieties of aptness: meta-aptness and full aptness. Let us continue to take archery as an example. According to Sosa, "shot selection is integral to the competence of a good huntress. Diana thus needs the second-order competence to assess her first-order competence and its required conditions. Since hunting is in part an exercise in shot selection, she must gauge her level of skill as well as her shape and situation, so as to assess risk properly" (Sosa, 2015: 68). Sosa's example suggests a distinction between a first-order practical competence (such as archery competence) and a second-order *reflective* competence (that is, a hunter's risk-assessment competence), which takes the first-order competence as its object of examination and evaluation. Diana's (first-order) archery performance has the AAA structure. Likewise, her (second-order) reflective risk-assessment performance has the AAA structure. To be clear, the AAA structure applied to higher-order performance can be described in terms of *meta-accuracy*, *meta-adroitness*, *meta-aptness*.⁶

For Sosa, "[a] shot is meta-apt iff it is well-selected: i.e., iff it takes appropriate risk, and its doing so manifests the agent's competence for target and shot selection" (Sosa, 2011: 8). In addition, a shot is *fully* apt iff it is "apt because meta-apt" (Sosa, 2011: 9). There are certain (absent or negative) relations between aptness and meta-aptness: A shot can be apt without being meta-apt, meta-apt without being apt, or both apt and meta-apt without being fully apt. Sosa gives vivid examples to illustrate these relations:

[Aptness without meta-aptness.] Suppose Diana sees a distant rabbit scurry in twilight fog, when she has drunk much wine. She might think there's little chance of success, *underestimating* her prowess. She shoots anyway and hits her target aptly. (Sosa, 2015: 68)

[Meta-aptness without aptness.] Seeing a still deer in the middle of a sunny field well within her range, [Diana] might competently judge that her shot would be apt and safe enough to be worth taking. Yet it might be one of those times when she misses anyhow.... (Sosa, 2015: 69)

[Aptness and meta-aptness without full aptness.] Diana... might consider whether to take a shot that she knows would be apt. What if she now decides by tossing a coin? (Sosa, 2015: 69)

⁶ For Sosa, the notion of "meta-aptness" can also be used to characterize the first-order performance: "Sometimes an agent responds properly by performing on the ground level, in which case that *positive performance* is meta-apt; sometimes the proper response is to forbear, so that the forbearing is meta-apt" (Sosa, 2011: 9).

In contrast to the third example, if Diana wants her shot to be fully apt, then she “must perform not only *in the light of* her apt belief that she would perform aptly, but also *guided by that belief*” (Sosa, 2015: 69; emphasis original).

Sosa’s AAA account of performance assessment (later called by Sosa the “theory of telic normativity”) is more complicated and powerful than shown here. But what has been presented above is sufficient for my purpose. Recall that for Dreyfus and Dreyfus, know-that and its cognates (such as calculative deliberation or perspectival deliberation) are required only at the level of competence (the fourth stage) or the level of mastery (the sixth stage). Even if deliberative know-that is possible at the level of expertise (the fifth stage), it is functionally superfluous. This superfluity is revealed by the swamping defense, according to which the value of *sheer* expert skilled action, which is produced merely by exercising intuitive know-how, *swamps* the value of *deliberative* expert skilled action, which is produced by an additional exercise of deliberative know-that. Now, thanks to the concepts, distinctions, and terminologies contained in the theory of telic normativity, a factor that has been overlooked comes to light. From a telic normative point of view, the value of (second-order) deliberative know-that can add extra value to a (first-order) expert skilled action, which is produced by (first-order) intuitive know-how. Namely, what matters most for the (first-order) action *as achievement* is not only success but also, and more importantly, the manner in which success is attained. An expert skilled action (occurring at the fifth stage of the Dreyfus model) can be apt, i.e., successful because competent. However, such an action might still fall short of a creditable action:

If an attempt [i.e., intentional action] succeeds aptly without being fully apt, there is an element of relevant luck in its success. Its aptness is not secured through the guidance of the agent’s second-order competence. It is thus lucky that the agent succeeds aptly. And this sort of luck reduces or blocks credit to the agent for their success, as it reduces or blocks credit to the agent for the aptness of their success. (Sosa, 2021: 21)

An expert skilled action, even if it is apt, might still fall short of (full) achievement if it is contaminated by luck. The value of *deliberative* expert skilled action (which is produced by exercising a first-order practical competence and a second-order risk-assessment competence) is superior to the value of *sheer* expert skilled action (which is produced merely by exercising a first-order practical competence) because it is fully apt in the sense that it reduces the sort of luck that blocks credit to the agent in question.⁷

⁷ From the perspective of the present author, anti-luck can make a contribution to expert skilled action. From the perspective of Christensen et al., (2016) and Montero (2016), control can make a contribution to expert skilled action. Can the two perspectives be related or integrated in a way that is mutually supportive? The answer is positive if we accept the inverse relation between luck and control, that is, “the more an action is subject to luck, the less it is under our control, and the more an action is under our control, the less it is subject to luck” (Franklin 2017: 203; see Riggs 2019 for a development and defense of the lack-of-control account of luck). In our present context, the more a skilled action is under agential control, the less it is subject to credit-reducing luck, and the more a skilled action is subject to credit-reducing luck, the less it is under agential control. That said, the two perspectives reflect different dimensions (i.e., causal and evaluative) of skilled action. I thank an anonymous reviewer for prompting me to consider this issue.

6 Concluding remarks

At the beginning of the paper, it was noted that if an agent S ϕ s skillfully, we attribute know-how to S . Let us formulate this claim as follows:

(S_0) If S ϕ s skillfully, then S knows how to ϕ .

We aim to know what know-how is. For Dreyfus and Dreyfus, such know-how cannot be explained in terms of know-that but only in terms of intuition. However, we now see that a more sophisticated characterization of an agent's performance reveals that know-that has an important role to play with respect to know-how.

Consider the following statements, in which the key concepts of the AAA account of performance assessment are applied:

(S_1) If S ϕ s accurately (but not adroitly), then S knows how to ϕ .

(S_2) If S ϕ s adroitly (but not accurately), then S knows how to ϕ .

(S_3) If S ϕ s accurately and adroitly (but not aptly), then S knows how to ϕ .

(S_4) If S ϕ s aptly (but not meta-aptly), then S knows how to ϕ .

(S_5) If S ϕ s fully aptly (i.e., aptly because meta-aptly), then S knows how to ϕ .

We might not say that (S_1) is true. We feel reluctant to say that (S_2) is true, especially when similar consequences (i.e., being inaccurate) continue to occur and when know-how requires success in a range of circumstances. What of the rest of these statements? (S_3) and (S_4), if they are true, grant that know-how is compatible with luck. In contrast, for (S_5), this compatibility is not the case. From a telic normative point of view, the know-how exemplified in (S_5) is better or more creditable than the know-how exemplified in either (S_3) or (S_4) because the former reduces the sort of luck that prevents credit from accruing to S , whereas the latter does not.

The characterization of S 's performance in (S_0) is not particularly sophisticated. S 's skillful or adroit performance can be characterized in a more sophisticated way, as in the cases of (S_2), (S_3), (S_4), and (S_5). If we are hesitant regarding the truth values of (S_2), (S_3), or (S_4), then (S_5) might be the best substitute for (S_0). Know-how in (S_5) can be understood as *hybrid* know-how,⁸ which refers to know-how that is a combination of a first-order practical competence and a second-order reflective competence. From a telic normative point of view, we should go beyond intuitive know-how and engage fully with know-that in expertise.

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⁸ I have addressed the notion of hybrid know-how featuring different lines of thought elsewhere (Author, 2011, 2014, 2016).

Declarations

Conflict of interest The author has no conflicts of interest to declare that are relevant to the content of this article.

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References

- Bloomfield, P. (2001). *Moral Reality*. Oxford: Oxford University Press
- Brevik, G. (2007). Skillful Coping in Everyday Life and in Sport: A Critical Examination of the Views of Heidegger and Dreyfus. *Journal of the Philosophy of Sport*, 34(2), 116–134
- Chassy, P., & Gobet, F. (2011). A Hypothesis about the Biological Basis of Expert Intuition. *Review of General Psychology*, 15, 198–212
- Christensen, W., Sutton, J., & Bicknell, K. (2019). Memory Systems and the Control of Skilled Action. *Philosophical Psychology*, 32:5, 692–718
- Christensen, W., Sutton, J., & McIlwain, D. (2016). Cognition in Skilled Action: Meshed Control and the Varieties of Skill Experience. *Mind and Language*, 31(1), 37–66
- De Brigard, F. (2019). Know-how, Intellectualism, and Memory systems. *Philosophical Psychology*, 32(5), 719–758
- Dreyfus, H. (1997). “Intuitive, Deliberative, and Calculative Models of Expert Performance”. In C. Zsombok, & G. Klein (Eds.), *Naturalistic Decision Making* (pp. 17–28). New York: Psychology Press
- Dreyfus, H. (2001). *On the Internet* (London: Routledge, 1st edition).
- Dreyfus, H. (2005). “Overcoming the Myth of the Mental: How Philosophers Can Profit from the Phenomenology of Everyday Expertise”, reprinted in M. Wrathall (ed.), *Skillful Coping: Essays on the Phenomenology of Everyday Perception and Action* (Oxford: Oxford University Press, 2014), 104–124
- Dreyfus, H. (2017). “On Expertise and Embodiment: Insights from Maurice Merleau-Ponty and Samuel Todes”. In J. Sandberg, et al. (Eds.), *Skillful Performance: Enacting Capabilities, Knowledge, Competence, and Expertise in Organizations* (pp. 147–159). Oxford: Oxford University Press
- Dreyfus, H., & Dreyfus, S. (1986). *Mind over Machine*. New York: Free Press
- Dreyfus, H., & Dreyfus, S. (2008). “Beyond expertise: Some Preliminary Thoughts on Mastery”. In K. Nielsen, et al. (Eds.), *A Qualitative Stance; Essays in Honor of Steiner Kvale* (pp. 113–124). Aarhus: Aarhus University Press
- Dreyfus, S. (2014). “System 0: The Overlooked Explanation of Expert Intuition”. In M. Sinclair (Ed.), *Handbook of Research Methods on Intuition* (pp. 15–27). Cheltenham, UK: Edward Elgar Publishing
- Dreyfus, S., & Rouse, B. (2018). Commentary on Fernand Gobet’s ‘The Future of Expertise: The Need for a Multidisciplinary Approach’. *Journal of Expertise*, 1(3), 181–183
- Franklin, C. (2017). The Luck and Mind Arguments, in Meghan Griffith, Neil Levy, and Kevin Timpe (eds.). *The Routledge Companion to Free Will* (New York: Routledge), pp. 203–212.
- Gobet, F. (2016). *Understanding Expertise: A Multi-Disciplinary Approach*. London: Palgrave
- Hoffding, S. (2014). What Is Skilled Coping? Experts on Expertise. *Journal of Consciousness Studies*, 21(9–10), 49–73
- Hoffding, S. (2018). *A Phenomenology of Musical Absorption*. London: Palgrave Macmillan
- Kahneman, D., & Klein, G. (2009). “Conditions for Intuitive Expertise: A Failure to Disagree”. *American Psychologist*, 64(6), 515–526
- Klein, G. (2003). *Intuition at Work*. New York: Currency and Doubleday

- Montero, B. (2016). *Thought in Action: Expertise and the Conscious Mind*. Oxford: Oxford University Press
- Montero, B. (2019). Chess and the Conscious Mind: Why Dreyfus and McDowell Got It Wrong. *Mind & Language*, 34, 376–392
- Osbeck, L., & Held, B. (2014a). “Introduction”. In L. Osbeck, & B. Held (Eds.), *Rational Intuition: Philosophical Roots, Scientific Investigations* (pp. 1–35). Cambridge: Cambridge University Press
- Osbeck, L., & Held, B. (Eds.). (2014b). *Rational Intuition: Philosophical Roots, Scientific Investigations*. Cambridge: Cambridge University Press
- Riggs, W. (2019). “The Lack of Control Account of Luck”. In I. Church, & R. Hartman (Eds.), *The Routledge Handbook of the Philosophy and Psychology of Luck* (pp. 125–135). New York: Routledge
- Rousse, B., & Dreyfus, S. (2021). “Revisiting the Six Stages of Skill Acquisition”. In E. Mangiante, & K. Peno (Eds.), *Teaching and Learning for Adult Skill Acquisition: Applying the Dreyfus & Dreyfus Model in Different Fields* (pp. 3–28). Charlotte, NC: Information Age Publishing
- Schwartz, A., & Drayson, Z. (2019). Intellectualism and the Argument from Cognitive Science. *Philosophical Psychology*, 32(5), 661–691
- Simon, H. (1995). “Explaining the Ineffable: AI on the Topics of Intuition, Insight and Inspiration”, *Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence*, Vol.1, 939–948
- Sosa, E. (2007). *A Virtue Epistemology*. Oxford: Oxford University Press
- Sosa, E. (2011). *Knowing Full Well*. Princeton: Princeton University Press
- Sosa, E. (2015). *Judgment and Agency*. Oxford: Oxford University Press
- Sosa, E. (2017). *Epistemology*. Princeton: Princeton University Press
- Sosa, E. (2021). *Epistemic Explanations: A Theory of Telic Normativity, and What It Explains*. Oxford: Oxford University Press
- Toner, J., Montero, B., & Moran, A. (2022). *Continuous Improvement: Intertwining Mind and Body in Athletic Expertise*. Oxford: Oxford University Press
- Tsai, C. (2011). The Metaepistemology of Knowing-How. *Phenomenology and the Cognitive Sciences* 10(4): 541–556.
- Tsai, C. (2014). The Structure of Practical Expertise, *Philosophia* 42(2): 539–554.
- Tsai, C. (2016). Ethical Expertise and the Articulatory Requirement, *Synthese* 193(7): 2035–2052.

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