THE PUZZLE OF LEARNING BY DOING AND THE GRADABILITY OF KNOWLEDGE-HOW

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Abstract: *Much of our know-how is acquired through practice: we learn how to cook by cooking, how to write by writing, and how to dance by dancing. As Aristotle argues, however, this kind of learning is puzzling, since engaging in it seems to require possession of the very knowledge one seeks to obtain. After showing how a version of the puzzle arises from a set of attractive principles, I argue that the best solution is to hold that knowledge-how comes in degrees, and through practice a person gradually learns how to do something. However, the two standard accounts of know-how in the literature, intellectualism and anti-intellectualism, cannot properly account for the distinctive way in which know-how is gradually acquired by practice, a process in which conceptual representations and practical abilities are intimately interwoven. Drawing on Gareth Evans's work, I outline an account that may do so, and use this account to distinguish between two forms of learning to explain why skill generally cannot be learnt through testimony, and requires practice.*

Much of our know-how is acquired through practice: we learn how to cook by cooking, how to write by writing, and how to dance by dancing.[1] As Aristotle argued, however, this form of learning is puzzling.[2] Learning is the acquisition of new knowledge, but practice seems to require exercising the very knowledge the person seeks to learn. To learn to do a pivot turn, for instance, the novice dancer practices by doing pivot turns; but then she seems to already know how to do pivot turns. For if she doesn't know how to do this, how does she make the turn? Paradoxically, learning by doing seems impossible.

To bring the problem into better focus, we should speak not of one but *two* puzzles that arise at different stages of skill acquisition, to wit:[3]

1. *Incompetence-to-Novicehood:* Someone who does not know *at all* how to do something, begins to learn a skill by practice (usually guided by someone else). (Most readers will be incompetent, in the sense in question, at riding a unicycle).

2. *Novicehood-to-Mastery:* With practice, the learner has become a novice, capable of doing the task on her own with variable rates of success, and less flare and fluidity than her teacher. Further practice might eventually lead to that higher level of mastery. (Many readers are (or have been) novices, in the sense in question, at playing a musical instrument).

However, if ability to perform a task is identical, or, anyhow, sufficient for knowing how to do the task, then the first transition, from incompetence to novicehood, is impossible as characterized.

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[1] Throughout the paper, I shall be entirely concerned with the particular form of know-how that has an intimate connection with action and has been the subject of debate between intellectualists and anti-intellectualists. Thus, I shall not be concerned with the kind of state that is attributed with a sentence such as 'Manuel knows how the game ended (the Raptors won)'. Even anti-intellectualists grant that such a state is propositional knowledge (on this point, see Bengson and Moffett (2011b)). I return to the debate about know-how in §5.

[2] *NE* 2.4 1105a21-23, and *Met.* Θ.8 1049b29-34.

[3] Thanks to an anonymous referee for helping me see that there are two different puzzles, each raising distinct problems.

Practice, after all, requires the ability to act; but then an incompetent person couldn't engage in practice.

I shall largely ignore this first version of the puzzle, because the assumption it depends on—that mere ability is sufficient for know-how—has been correctly rejected by most contemporary theorists.[4] Indeed, the above puzzle reveals the assumption's central shortcoming which is that know-how has stronger possession conditions than ability. For instance, people are able to perform tasks they have never performed, but know-how generally requires at least some experience with a task. Why this is so is an interesting question I shall attempt to answer at the end of the paper.[5]

Reflection on the second stage, however, reveals a modern version of the Aristotelian puzzle that is not so easily dismantled, because it arises from principles about knowledge-how and intentional action that are widely endorsed and can be independently motivated. Briefly, the problem is that the novice seems capable of intentionally doing the task she aims to learn to do, which in turn requires her to know how to do it; but that makes it impossible to see her as a learner.

I'll develop a more careful version of this puzzle in §§1-3, aiming to show that it cannot easily be dissolved. Instead, I shall argue that to solve it requires a reconceptualization of know-how and its relation to ability and intentional action. A central part of the solution is the contention that knowledge-how is gradable: one can know how to do something partially or fully, better or worse (§4). Although this may seem like an innocuous claim, it has significant implications for the contemporary debate between intellectualism and anti-intellectualism about know-how. The last, and central section of the paper (§5) explores its implications for this debate, arguing that

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[4] I return briefly to this version of the puzzle below (pp.14-15).
[5] Another reason to reject the view that ability is sufficient for know-how is that ability ascriptions are extensional, whereas know-how ascriptions are intensional. Thus, a dancer may be able to perform a semaphore recital of Gray's 'Elegy' without knowing how to do so (Carr, 1979).

neither view can properly account for the distinctive way in which know-how is gradually acquired by practice. I close by outlining a view that takes advantage of both intellectualist and anti-intellectualist insights to account for the distinctiveness of practice as a learning process.

1. The Modern Puzzle

The modern puzzle of learning by doing arises from the conjunction of the following three claims:

> **Learning-How requires Ignorance-How (LIH):** Necessarily, while *S* is learning how to Φ, she doesn't know how to Φ.
>
> **Learners Act Intentionally (LAI):** At least in some cases of learning by doing, the learner intentionally does what she aims to learn how to do.
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> **Intentional Action requires Know-How (IAK):** Necessarily, if *S* Φs intentionally, *S* knows how to Φ.

This is an inconsistent triad. For let *c* be a case where *S* is learning how to Φ. Given (LAI), we may assume the agent Φs intentionally in *c*. So, applying (IAK), *S* knows how to Φ in *c*; however, applying (LIH) yields the conclusion that *S* doesn't know how to Φ in *c*. Contradiction.

We must therefore reject one of the claims; but it is hard to decide which. (LIH) seems like a straightforward application of the platitude that one cannot learn what one already knows. For now, then, I want to take it as given, and evaluate the other two principles, (LAI) and (IAK), which appear more suspicious.

Consider (LAI) first, by focusing on a standard case of someone learning how to cook paella, at the novice stage: she has seen an instructor make the dish, has made it once under his guidance, and now attempts to cook it without aids. Yet, since she's not an expert, her attempts often result in mistakes that either make the dish worse, or ruin it altogether (she overcooks the

rice, or puts too little stock, etc.). But suppose that in one of her attempts at this stage she takes the right steps and cooks a good dish. It is hard to deny that while she was cooking the paella, she was doing so intentionally. Our intuitive judgments therefore support (LAI).

(IAK) has received extensive support among philosophers of action.[6] A central attraction of the principle is that it explains why certain action descriptions cannot be instantiated as intentional actions (Hornsby, 2016; Mele & Moser, 1994; Small, 2012; Wolfson, 2012). Consider, for instance, the description *rolling a six on a (fair) die*. Although we often roll sixes, we never do so intentionally. Why not? An application of (IAK) provides an attractive explanation: we do not know how to roll a six, so we can't do so intentionally. Imagine someone who did, such as a man who learnt to take advantage of a superhuman ability to see things at slow speed to reliably know when to drop a die so as to get a six. Such a man would know how to roll a six, of course; but, by the same token, we would not balk at the claim that he can roll a six intentionally. In this way, knowledge-how and the capacity to act intentionally seem to sway together, as per (IAK). Even if we go on to reject the principle, we must account for this nexus.

I evaluate the merits of these principles in further detail below by responding to what I take to be the best objections to reject each *tout court*.

2. More on (LAI)

The strongest, and most principled objection to (LAI) appeals to the Anscombean ([1957] 1963) principle that:[7]

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[6] For endorsements of the principle as stated, see Anscombe ([1957] 1963, p. 88), Mele and Moser (1994), Stanley (2011a, 2011b), , Small (2012), Wolfson (2012), Hornsby (2016), and Pavese (2018), among many others. Qualified versions of the principle are endorsed by Hawley (2003), Setiya (2008, 2012), and Pavese (2017a).

[7] Apart from Anscombe, defenders include Hampshire (1983), Newstead (2006), Rödl (2007, 2011), Small (2012), Thompson (2011), Wolfson (2012), Stathopoulos (2016), and Beddor and Pavese (forthcoming).

Practical Knowledge Principle (PKP): Necessarily, if an agent acts intentionally, she must know what she is doing (under the description under which she acts intentionally).[8]

For suppose (PKP) is true. In the imagined case, it seems plausible to think that the novice cook doesn't know how to cook paella because her methods too easily end in failure. Her belief that she is cooking paella is thus easily falsifiable. But knowledge requires safe belief, belief that cannot easily be false.[9] Hence, the novice cook doesn't know that she is cooking paella when she is cooking the dish. By (PKP) it follows that she isn't cooking paella intentionally.[10]

Many reject (PKP) by appeal to counterexamples, such as this famous one from Davidson:[11]

> [I]n writing heavily on this page I may be intending to produce ten legible carbon copies. I do not know, or believe with any confidence, that I am succeeding. But if I am producing ten legible carbon copies, I am certainly doing it intentionally. (2001b, p. 92)

However, as followers of Anscombe have recently argued, the strength of this objection is questionable.[12] For we saw that there are good reasons to think that one cannot be Φing intentionally if one's success in Φing is overly accidental; but the carbon copier's success seems overly accidental, too much like rolling a six on a die.[13] Hence, there is pressure to think that the carbon copier doesn't act intentionally.

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[8] Central to Anscombe's understanding of the principle was the claim that this knowledge is practical, "the cause of what it understands" (p.87), but for our purposes we can focus on the weaker claim that it requires knowledge.

[9] A more careful statement of a safety principle is as follows:

   Safety: If *S* knows *p*, then in nearby cases where *S* believes *p* (or has a similar belief), the belief is true. Defenders of safety include Ernest Sosa (1999, 2000), Timothy Williamson (2000), and Duncan Pritchard (2007, 2008, 2009), among many others.

[10] To be clear: Although my strategy in responding to this objection will be to reject (PKP), there may be other avenues. Thus, it is open to someone attracted to the principle to reject other principles such as safety. A different strategy suggested by the solution to the puzzle I will eventually advocate, would be to modify (PKP) to admit of degrees of knowledge. It is beyond the scope of this paper to explore these options.

[11] What follows is from a passage in "Intending". An earlier and more condensed formulation of the example appears in his "Agency" (2001a, p.50). A similar example is offered by Bratman (1999 [1987], p.37).

[12] See Small (2012); Stathopoulos (2016); Thompson (2011); Wolfson (2012).

[13] Thompson (2011), for instance, compares the case to one of "buying a lottery ticket" (p.210).

(PKP) should nonetheless be rejected. As I argue elsewhere, a version of Williamson's (2000) anti-luminosity argument shows that the principle conflicts with deep-seated principles about knowledge (Piñeros Glasscock, 2020). Here is a quick version of the argument:[14] Suppose a musician is singing Marc Anthony's *I need to Know* over and over for several hours, until she completely loses her voice so that by the end of the process she is no longer singing. Imagine further that the musician's ears are covered with fully sound-proof earplugs, so that she cannot hear herself singing. The musician will start out knowing that she is singing the song, but know that by the end of the process she is not singing it, even when she tries, since she knows that after several hours her voice is gone. This means that at some point in the process she will be in an epistemically hazardous situation, where her beliefs about what she is doing could easily be false. In such situations, even if she correctly believes that she is singing *I Need to Know*, her epistemic confidence would be out of place, and would thus not amount to knowledge. There is nothing special about the musician's situation: given our limited discriminatory capacities, we may find ourselves in an epistemically hazardous situation with respect to virtually any action. This means that for limited creatures like us, it is always possible to Φ intentionally without knowing it.

Moreover, there are independent reasons to hold that our novice is cooking paella intentionally, reasons that do not apply with equal force to the case of the carbon-copier, and that Anscombeans should recognize. For Anscombe ([1957] 1963), an action is intentional (under a description) just in case it enters into an instrumental order, which she famously characterizes in terms of a special sense of the question, 'Why?'. Answers to this question characteristically take the form ⌜ I am Φing in order to Ψ ⌝. Yet, we may suppose that the actions of the novice paella

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[14] This rendering of the argument is indebted to Srinivasan (2015). The full version of the argument, which cannot be offered here, aims to show that (PKP) is untenable even under views on which practical knowledge is the formal cause of intentional action.

maker enter into an instrumental order of the relevant sort: e.g. she turns on the stove in order to heat the pot in order to cook the rice, etc. And, of course, she cooks the paella in order to learn how to cook it (and to eat it!). By contrast it is more natural to say that the carbon-copier presses the pen in order to *try* to make 10 copies (rather than to make them).

In turn, this may be because the paella maker's action is shaped and structured through her control and guidance.[15] This is shown by the fact that she would modify her actions in complex ways to attain her aim as needed. For instance, if she initially forgot to turn on the stove, she would do so when she noticed; if she spilled water as she was pouring it on the paella, she would refill the ladle and add more; and if it was obvious that the rice was burning, she would lower the heat, or take the paella off the stove. Hence, her agency is the principal cause of her success.[16] This contrasts with the carbon copier, who has been described as someone who may just "hope for the best" (Small, 2012, p. 199).[17] After all, her actions are in no way responsive to how the process is going in the envisaged case.[18] He cannot discriminate (nor, a fortiori, act on her discrimination) between the case where she is making 9, 10, or 11 copies, in the way that the paella maker can discriminate between whether the stove is turned on or not, or whether the water has spilled. These considerations support the already intuitive view that the novice paella maker acts intentionally.

3. More on (IAK)

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[15] Thus, even Beddor and Pavese (forthcoming) should view this as a case of intentional action, since their rejection of my application of the anti-luminosity argument (2020) is based on the contention that intentional action is controlled action. If so, however, the present case may also call into question their (purely) epistemic analysis of control.

[16] The importance of control for intentional action is widely recognized. See e.g. Fridland (2014), Wu (2016), Stout (2018), Shepherd (2021, ch.2), and Beddor and Pavese (forthcoming).

[17] For similar verdicts see Thompson (2011), and Wolfson (2012).

[18] As Thompson (2011) argues, the case where the actions are thus responsive raises no problems for PKP, because in that case the agent acts knowing what she is doing.

(IAK) has been rejected on the basis of counterexamples like the following (Setiya, 2012): A bomb is about to explode, and a man who doesn't know how to deactivate the device nonetheless attempts to do so by cutting one of the many wires inside the device. Lo and behold, he luckily picks the right wire, deactivating the bomb. This deactivation seems intentional under the description *deactivation of the bomb,* despite the fact that the agent doesn't know how to deactivate the bomb. If this is right, the case is a counterexample to (IAK).

However, there are good reasons to think that the luck involved in this case is incompatible with intentional action. To see this, compare it to the following case: a bomb is about to explode, but the designer (a mad scientist, no doubt) has left behind a mechanized fair die. If a six is rolled with that die on the first roll, the bomb will be deactivated; otherwise, it will explode. Suppose you roll the die and get a six, deactivating the bomb. Have you thereby deactivated the bomb intentionally? Clearly not. Yet, this case is structurally analogous to the previous one. So, something's gotta give. I'm inclined to think that what should give is the judgment that Setiya's initial deactivator acts intentionally.

There is, in fact, an attractive explanation for why we think the action is intentional, even though it is not in any sense of interest to action theory. The explanation builds on Gareth Evans's (1982, pp. 129-132) insight that attributions of psychological states "have their home in the activity of interpreting, or making sense . . . of others" (129-30). Evans offers the following illustration of the phenomenon: "I go to a radio station and say that I want to register a complaint; I am told 'Then you want to see Mr *X* of our legal department'" (130-1). Here we have a legitimate attribution of a desire; for there is clearly a sense in which, in the example, I want to see Mr *X* of the legal department. Nevertheless, I may have no idea who Mr *X* is, or that he belongs to the legal department—indeed, I may not even have the least idea what a legal department is! However,

given these assumptions, there is also another clear sense in which the attribution would be false, one where we take desires to be representational states *of the agent*. For in this sense the agent lacks the requisite representational capacities to so much as desire seeing someone from a legal department.

Call the first sense 'interpretational', and the second 'representational'. We can apply the distinction to attributions of intentional action. Thus, I suggest that the claim that Setiya's bomb-deactivator acts intentionally is true only on the interpretational sense; but it is the representational sense that is of interest to us. For it is the representational sense that is clearly at play in theses like (IAK) and (PKP). As Tenenbaum (2021) puts it, these theses "create opaque contexts that track the agent's point of view" (p.13), and, we may add, the requirements for having that point of view to begin with. (IAK) is utterly hopeless if the attributions are understood in the merely interpretational sense, which would allow us to attribute to the agent intentional actions that far outstrip her representational capacities.[19] And in the representational sense, I claim, neither bomber acts intentionally.

That said, I shall go on to propose a modification to the principle under discussion. This is also what Setiya suggests, so I want to close this section by considering his preferred proposal:[20]

IAK-Setiya's Version (IAK-SV): Necessarily, if S Φs intentionally, S knows how to Φ, or she knows how to do something by which she Φs.

Our aim is to find a modification that will solve the puzzle of learning by doing. At first sight, Setiya's proposed modification seems to do so by presenting an attractive modification of (IAK)

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[19] Alternatively, we may take (IAK) to hold in both the interpretational and the representational sense, so long as we are careful to apply the same standards for the attributions of intentionality and know-how. But, these extensionally-individuated attributions are not at play here (as shown by Carr's example above (p.3n5)).

[20] Setiya briefly notes the possibility of an alternative principle along the lines I defend below, but he does not explain or defend it in any detail (p.286n3). (IAK-SV) clearly represents his considered view.

that would dissolve the puzzle. For appealing to (IAK-SV), we could say that the person who learns to Φ by Φing is someone who only knows how to do things by which to Φ, but does not yet know how to Φ, which is what she seeks to learn.

However, this solution will not work in full generality, since a version of the puzzle arises for basic actions (actions not done by doing something else).[21] For instance, consider an actor playing the role of a historical figure known for his characteristic frown (a good candidate for a basic action). Suppose the actor is trying to learn to make this frown. We might imagine that the actor is at a stage of the learning process where he often fails to make the frown correctly when he tries. But if he succeeds at it after some practice while filming a scene we would be hard-pressed to deny that he did so intentionally. Since in this case it is neither true that the actor knows how to make the frown (since he is still learning) nor how to do something by which to do so (since it is a basic action), the solution to the puzzle of learning by doing in terms of (IAK-SV) is unavailable. Hence, we must look for a different solution.

4. Solution by Gradation

Since there are good reasons to hold each of the principles that lead to the modern puzzle of learning by doing, and we have been unable to find an argument to discard any outright, we should look to modify them while preserving their spirit. In this vein, I propose a solution that is predicated on the contention that knowledge-how is gradable: you can know how to do something somewhat, more or less well, excellently, badly, etc. This may seem like an innocuous claim. After all, the following seem like perfectly legitimate attributions of knowledge-how:

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[21] There is a debate in the literature as to whether there are basic actions *at all* in this sense (see especially Lavin (2013)). However, I agree with Setiya that the arguments against basic action fail in full generality, and my objection rests on this agreement.

(1) Valeria knows how to run well/badly.

(2) Ann knows how to swim better than Bob.

As we shall soon see, however, the correct interpretation of these attributions is a hotly debated matter, because it has significant consequences for our understanding of the nature of knowledge-how.

First, though, how does recognition of the gradability of knowledge-how help with the puzzle? It helps, because it enables us to see the process of practicing as one where one gradually learns how to perform an activity. On this view, when an agent learns by doing, she begins by not knowing at all how to do what she wants to learn how to do. At this point, her actions are not intentional under the relevant descriptions (though perhaps, they are intentional under descriptions such as *trying to do…*). This is the first stage of the process identified at the outset, from incompetence to novicehood. The incompetent agent becomes a novice after acquiring *enough* knowledge-how through practice that she can start acting intentionally. Our novice paella maker is at this stage: she knows how to cook paella, but not well. As such, she can intentionally cook paella, but she must keep practicing if she wants to fully learn how to do it.[22]

This story is intuitively attractive; but its coherence depends on accepting a modified, degree-sensitive, version of two of the initial principles, (LIH) and (IAK), as follows (the modifications are underlined):

(LIH*): Necessarily, while *S* is learning how to Φ, she doesn't know how to Φ <u>fully</u>.[23]

(IAK*): Necessarily, if *S* Φs intentionally, *S* knows how to Φ <u>to some degree</u>.

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[22] Among others, this will require strong counterfactual success (Hawley, 2003).

[23] Since there is no logical upper bound of mastery for many activities, this statement of the principle has the welcomed implication that even the most accomplished masters can still engage in practice to learn how to act better. Nevertheless, as with many such gradable adverbs, there appear to be conventional thresholds that allow us to say that someone has fully mastered an activity. In a given context, then, it may be improper to describe someone as 'learning' while practicing (though it would be proper to describe them as 'rehearsing' or 'training' instead). For an excellent account of the importance of rehearsal, see Montero (2016, ch.6).

These principles show how someone can Φ intentionally, and still be engaged in a process of learning how to Φ by Φing. By (IAK*), such a person has enough know-how to act intentionally. However, since she is not required to fully know how to act in the relevant way, she can engage in a process of learning because she can gain more knowledge, as per (LIH*).

This solution requires only minimal modification to the letter of the principles, and it preserves their spirit. (IAK*) allows us to see why it should be that intentional action and knowledge-how go hand in hand, such that it is impossible to act intentionally without (at least some) knowledge-how. We cannot roll a six intentionally because we do not know *at all* how to do so.[24] Moreover, (LIH*) clearly expresses the platitude that one cannot learn what one already knows, since it rules out the possibility that someone who has fully mastered a task (where this is possible) could engage in a learning process.

It is hard to think of an alternative solution that will solve the puzzle of learning by doing in an equally intuitive way while preserving the spirit of the initial principles. I therefore conclude that the best solution to the puzzle is to accept that knowledge-how comes in degrees, along with a corresponding adjustment to the principles that give rise to the puzzle.

5. Implications for Intellectualism

I have offered a general solution to the modern problem of learning by doing as consisting in the gradual acquisition of knowledge-how. This general solution must be supplemented by an explanation of what such a gradual process consists in. In this last section, I argue that neither of

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[24] There are two ways to develop this point: First, as I am suggesting in the text, we may endorse the claim that *some* level of knowledge-how is required to be able to Φ intentionally, and deny that we have *any* knowledge-how to roll a six on a die. Alternatively, we may identify a certain threshold of knowledge-how to Φ that one must meet to be able to Φ intentionally. This would allow us to say that we may have *some* degree of knowledge how to roll a six, but deny that it meets the relevant threshold. Because I do not think we have any knowledge of how to roll a six on a die, I prefer the first strategy. Thanks to Tim Clarke and John Pittard for helpful discussion on this question.

the main contenders in the literature on knowledge-how gives us an adequate explanation, and outline a non-standard position that might be able to do so.

The contemporary debate on the nature of know-how started with Gilbert Ryle's influential discussion in *The Concept of Mind* (1949), from which arose the two dominant positions in the literature:[25]

Intellectualism: *S*'s knowing how to Φ consists in *S*'s knowing a proposition/a set of propositions/an answer to a question.

Anti-Intellectualism: *S*'s knowing how to Φ consists in *S*'s having an ability or disposition to (centrally, but not uniquely) Φ intentionally.

In much of his work, Ryle sought to make progress on this debate by investigating the nature of practice (see especially Ryle (1971)). I shall follow Ryle's lead here. However, whereas Ryle argued that reflection on the nature of practice supports an anti-intellectualist position, I shall argue instead that it should lead us to question the very terms of the contemporary debate.

Let us start by considering the suggestion that accounting for the possibility of learning by doing is difficult for the anti-intellectualist.[26] If knowing how to Φ consists simply in having the ability to Φ, the Aristotelian paradox arises: either the person already has knowledge-how/ability to engage in the process of learning by doing (but then she doesn't need to learn); or else she does

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[25] I am here using the standard labels in the literature. See Bengson and Moffett (2011a) for a different proposed terminology. What I am calling 'intellectualism' they call 'propositionalism'. Note, also, that although I am following standard practice in counting Ryle as an anti-intellectualist, he would likely have rejected the label (Kremer, 2017b).

[26] See Bengson and Moffett (2011b, pp. 33-34) for a good discussion of this version of the puzzle, based on the transition between incompetence to novicehood (the first version presented in the introduction). They go on to suggest a solution to the above problem in terms of the claim that only a "minimal power" is required to begin practicing, on the basis of which one can develop a different, "substantive power". As they note, one problem with this proposal is the difficulty of drawing the distinction non-circularly, since Ryle (1949, 1971) appears to think that intelligent powers are distinguished in terms of whether they are acquired by practice or by mere drill. A further problem is that by positing distinct powers, the account obscures the relation between them. By contrast, my proposed solution treats the process as one of developing a single capacity (or sets of capacities) gradually.

not have it, but then she cannot engage in the process to begin with—for how could one do what one is unable to do?

Though aimed at a different version of the puzzle, the resources from the previous section are sufficient to solve this one too. The anti-intellectualist should say that one has an *undeveloped* ability at the incompetent stage, and seeks to develop this ability into a *masterful* one (cf. Ryle (1949, p. 59)).[27] The transition from an undeveloped to a fully developed ability just is the gradual transition from incompetence, through novicehood, into masterhood.

By contrast, the intellectualist position seems to sit uneasy with the proposed solution and its commitment to gradability. The reason is that, as Ryle (1949) observed, intellectualism seems to leave no room for gradability. Ryle argued as follows:

(3) Knowledge-how is gradable.

(4) Knowledge-that is not gradable.

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(5) So, knowledge-how is not a form of knowledge-that.

Ryle defended (3) and (4) on the basis of knowledge-how attributions (1949, p.59). Whereas sentences like (1) and (2) above are perfectly fine, (6) and (7) are infelicitous.

(6) ??? Abdullah knows badly that Bo runs in the morning.

(7) ?? Catalina knows that Bogota is in Colombia better than Dug.

This suggests that knowledge-how is a gradable attribute, whereas knowledge-that is an absolute one. As such, the intellectualist reduction of one to the other fails. By contrast, if we identify

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[27] In some cases, one starts by having no ability, in the sense that one cannot, of one's own, accomplish the relevant task (obviously, this is a stronger notion of ability than mere possibility). In these cases, as Aristotle notes, it is still possible for one to do the task either by luck or with an instructor's help (*NE* 2.4, 1105a22-3). On the importance of the latter case, see Small (2014).

knowledge-how with a certain ability, as Ryle suggested, gradability is easy to explain, since abilities are the sorts of things one can have in various degrees.[28]

The central response that intellectualists have offered to this argument is to question Ryle's interpretation of the linguistic data in support of (3). Ryle's argument assumes that the gradable adjectives in sentences like (4) and (5) must modify 'knows' or 'knows how' (taken as a unit), so that, ascending semantically, it is the knowledge relation that is gradable. However, intellectualists present reasons to hold instead that these adjectives modify other elements of the sentence. For instance, Stanley (2011) suggests that they modify 'how' (so, ascending semantically on his preferred analysis, it is the ways of doing that are gradable rather than the knowledge).

The most sophisticated and systematic version of this type of response is offered by Carlotta Pavese (2017a). Pavese's response is anchored on the claims that: (i) knowing-wh in general consists in knowing an answer to a question; (ii) knowing an answer to a question consists in knowing a set of propositions *relative to a question*; and (iii) gradability is a property of answers, parasitic on properties of questions.[29] To illustrate: (i) Knowing where the Botero museum is consists in knowing an answer to the question <Where is the Botero museum?> (ii) In turn, this consists in knowing, relative to a question, a set of propositions, such as:

(8) <The Botero museum is in Bogota>.

(9) <The Botero museum is in La Candelaria>.

(10) <The Botero museum is located along that street [pointing], walking 3 blocks that way>.

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[28] On Ryle's views, see Hornsby (2011); Kremer (2017a, 2017b). As these authors make clear, it is a mistake to think that Ryle was proposing that knowledge-how is a non-rational capacity; rather, he was seeking to show how rationality extends beyond the realm of propositional attitudes.

[29] Questions here are to be taken not as the linguistic items ('interrogatives'), but rather as the denotations of these interrogatives. A standard linguistic approach identifies the extension of a question with the set of all true propositions that settle it correctly. I use angled brackets to refer to both questions and propositions.

Finally, (iii) in virtue of their relativity to questions, answers can be evaluated as more or less complete (quantitative metric), or better or worse (qualitative metric), relative to a context.[30] For instance, in the context in which (10) is true, someone who knows (no more than) < The Botero museum is located along that street [pointing as in (10)]> will know partly where the museum is, whereas someone who knows (10) will know it fully.[31] On a qualitative metric, someone who knows a proposition with certain qualities (e.g. more accuracy) knows a better answer to the question. For instance, someone who knows only (10) will know a better answer than someone who knows only (8) or (9).[32] For Pavese, the gradability of knowledge-how attributions reduces to the gradability of answers, a view consistent with intellectualism.

This strategy successfully undercuts Ryle's argument by undermining his grounds for (3). However, it does not as such address the challenge that my argument raises. For I have argued that we must admit that knowledge-how is gradable to solve the puzzle of learning by doing. Unlike Ryle's argument which relied on the legitimacy of knowledge-how attributions, this is an argument to the best explanation based on general principles expressing essential connections between knowledge-how, learning, and intentional action. To determine whether appeal to the gradability of answers helps, we need to ask: What is the nature of the gradual process by which a person comes to acquire knowledge-how by practice? Only by answering this question shall we be in a

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[30] More carefully, in Pavese's framework gradability is accounted for in terms of both relativity to a question and to a topic (or, in the case of knowledge-how, relativity to a method). This further parameter is needed to explain why, for instance, we attribute partial know-how to someone who knows part of a recipe (p.366-9).

[31] One worry about this account is that it is overly permissive. <Going out the door of my house> is presumably part of the answer to how to get anywhere outside my house; but intuitively there are many places I don't know how to get to even partially. Perhaps the worry can be assuaged in pragmatic terms in ways familiar from the literature on causal talk (Lewis, 1973). On this view, just as we don't count certain events as causes because of how trivially related they are to the context, we don't count certain people as knowing how to do certain things given how trivial their knowledge is. Another possibility would be to appeal to the semantic notion of a minimal part in the sense of Dowty (2012, ch.3), commonly used in the explanation of a similar problem in the semantics for progressive VPs (Rothstein, 2008, ch.1). On this view, to count as knowing how to do a given task, a person must meet a minimal threshold of knowledge, which is not generally met by knowing that the way to go somewhere starts by heading out the door.

[32] At least, in most contexts, e.g. where a tourist in Bogota is asking for directions.

position to tell whether intellectualist or anti-intellectualist accounts of the gradability of knowledge-how succeed in capturing the distinctive nature of learning by doing.

We have already considered how anti-intellectualists would respond to the question: the practice process consists in the gradual development of abilities, starting from mere ability (incompetence), to having an undeveloped ability (novicehood), to having a masterful ability. Approaching the question from an intellectualist position of the sort defended by Pavese offers an alternative answer: the process consists in the gradual acquisition of more and/or better information relative to a question. On this view, the person who is in a process of learning how to cook paella begins at the incompetent stage where she doesn't know at all an answer to the question <How to cook paella?>. As she practices, she begins to learn propositions of the sort that might constitute such an answer, propositions such as <I start by pouring oil in the pan>, <I stir the rice, like this [referring to some way of stirring]>, <when the rice starts getting dry, I have to add more stock>, etc.[33] Once she knows some appropriate set of such propositions, she will know how to cook paella, though perhaps only partially, and perhaps not very well; but such partial knowledge may be enough to cook paella intentionally, which she might do in order to fully learn how to do so. The transition between worse to better knowledge consists in learning more and/or better answers. For instance, she might learn that she needs to pour a determinate amount of oil (relative to the size of the paella) instead of the more general proposition that she needs to pour oil; or she might learn that *this* is a better way to stir the rice than *that* (say, because it minimizes spillage).[34]

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[33] And, she learns them in a practical mode (Pavese, 2015; Stanley, 2011a, 2011b; Stanley & Williamson, 2001). For an excellent discussion and criticism of the notion of practical senses see Glick (2015), though his objections depend on the assumption that knowledge-how doesn't entail ability, which intellectualists like Pavese reject.

[34] Such demonstrative knowledge will presumably be an essential component of any knowledge-how (cf. Ford (2016)), and, in my view, the impossibility of acquiring it otherwise largely explains the importance of practice. In Piñeros Glasscock (ms), I argue that intellectualists cannot account for such practical demonstrative knowledge. For an attempt, see Stanley (2011a: 166ff.).

An apparent advantage of the anti-intellectualist story is that, as Ryle (1949, p.59) noted, it explains why practice seems essential to learning how to do something, in a way that is not essential to learning facts in general. For instance, you might learn where the Botero Museum is just by being told by a local; but generally, you need to practice a task before you learn how to do something, such as cooking paella. The anti-intellectualist can explain this contrast in terms of the fact that abilities are in general developed through repetition: for instance, one can develop the ability to lift a heavy object by repeatedly lifting heavy objects. Knowledge-how acquisition is thus seen as a species of this more general phenomenon. The problem, however, is that this simple account does not withstand empirical scrutiny. As Lehmann and Ericsson (1997) note, a significant amount of scientific evidence suggests that "mere repetition and experience lead to more fluent performance, but by themselves do not lead to the mental representations that experts employ" (p.54). In a similar vein, Winstein and Kay write more recently: "What is clear from the evidence to date is that mere repetition of simple tasks that are well within the capability of the performer will most certainly not induce neural plasticity or learning" (2015, p. 337).[35] However, if knowing how to do something just consists in having a certain ability which is developed by practice, we should be puzzled as to why it cannot be developed through mere drill, as with other abilities.[36]

By contrast, intellectualists have a ready explanation of this phenomenon. Since learning how to do something consists in learning information, it requires the engagement of conceptual and representational capacities, consistent with the findings in psychology. A related advantage is

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[35] See also Fridland (2019), who surveys a wealth of empirical evidence to show that the process of chunking is constituted not just by associative mechanisms, but also by a higher-order cognitive process she calls 'parsing' (following Wymbs, Bassett, Mucha, Porter, and Grafton (2012)), which divides tasks into their 'logical' parts.

[36] The problem is not decisive, but I believe it will ultimately force the anti-intellectualist into a 'mixed' view that sees knowledge-how as partly constituted by at least some representational states (cf. (Levy, 2017)). However, this will then lead to a similar problem as explored below for intellectualism: so long as the abilities and the informational states are seen as distinct components, it will be hard to explain why they are developed through a single process, practice.

that the intellectualist can straightforwardly treat practice as a genuine *learning* process, one that consists in the acquisition of knowledge (as standardly understood).[37] Yet, there is also something suspect in the intellectualist treatment of practice, because it leaves out features that seem constitutive of the process. Let me explain.

Everyone agrees that we shouldn't count the development of muscle mass as constitutive of the process of learning how to throw a baseball (even if it is a necessary requirement).[38] So too with several such concomitants that are nonetheless necessary to improve one's abilities. The intellectualist can easily explain this: on her view, only the fact-learning features are constitutive of the learning process. The problem is that this seems to leave out *too much*. For it is hard to believe that the abilities to move and coordinate one's movements in complex ways that sports players, for instance, develop in the course of learning how to play a sport are to be left out of the account of what she learns, on par with muscle acquisition. We can sharpen the worry by noting that although I have so far been treating practice as the paradigmatic way of learning *how to do something*, I could equally well have treated it as the process of learning a *skill*.[39] Yet, learning a skill surely consists in the acquisition of certain abilities, for skill *is* itself a complex ability.[40] The problem with intellectualism, then, is that it must treat the process of learning-how and skill-

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[37] It also makes it easier to see why one can sometimes acquire knowledge-how in ways independent of practice. For instance, reading about how to cook paella on a book can help one learn how to cook paella. Thanks to a referee for pointing this out. I discuss this issue at more length below.

[38] The claim that features such as mere muscle mass are no constitutive of knowledge-how is common ground between intellectualists and anti-intellectualists. As Kumar (2011) writes in a paper defending anti-intellectualism: "Having the ability to ride a bike . . . requires not just know how but also a sufficient degree of muscular development; however, having this ''dumb'' physical property *is not a condition on knowing how* (p.148, my emphasis). In a similar vein, Stanley and Williamson (2017) argue that "performance involves non-cognitive factors, like strength and speed. But leaving those aside as *not themselves part of skill* (someone's great strength may enable him to win a boxing match despite his lack of skill at boxing), there is a remaining cognitive aspect to skill" (p.717, my emphasis).

[39] Ryle (1949), it is worth noting, freely switches between the two terms (see p.59, et passim).

[40] Indeed, in certain Romance languages, the word for 'skill' and 'ability' are the same: 'abilidad' is the best Spanish translation for both terms. I am here indebted to the discussion in Pavese (2016).

development as distinct processes—and treat only one of them as a learning process; whereas intuitively there is a single learning process referred to by different descriptions.

To flesh out the problem, consider how it arises for Stanley and Williamson's (2017) view that being skilled at Φing consists in being disposed to know Φ-guiding facts. Set aside the worry that this account clashes with the intuitive view that being skilled at Φing rather consists in having the capacity to Φ (in a special way). The problem I wish to highlight arises when we conjoin this account of skill with the intellectualist view of knowledge-how. Since being skilled at Φing and knowing how to Φ are, on this view, distinct states, it is not clear why they would always go hand-in-hand in the process of learning by doing.[41]

In my view, the best solution available to the intellectualist begins with the following two claims:

(11) **Know-how entails ability:** If S knows how to Φ (badly/well) under a practical mode of presentation, then, to that extent, S is able to Φ (badly/well).

(12) **Skill is practical ability:** Being skilled at Φing consists in having the practical ability that is required for knowing how to Φ [as per (11)].

(11) is now widely endorsed by intellectualists (Brogaard, 2011; Pavese, 2015, 2017a, 2017b; Stanley, 2011a).[42] Indeed, it is supposed to be part of the payoff of appealing to practical modes of presentation that it allows us to account for such a connection. Together with (12), it allows the intellectualist to explain why a process of learning how to Φ by practice is always a process of acquiring a skill. Still, unless (11) is strengthened, it does not yet explain why the converse is also true. It seems, then, that intellectualists must endorse the stronger:

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[41] Stanley and Williamson are emphatic that "the knowledge states connected to skill are not exclusively or even mainly expressed by the "how" construction [by which know-how is attributed]" (p.714).
[42] Though it is worth noting that Stanley and Williamson (2001) initially seem to reject this view. This is why Glick (2015) was justified in assuming the falsehood of (11) in his criticisms of practical modes of presentation.

(13) **Know-how and ability are mutually entailing:** S knows how to Φ (badly/well) under a

practical mode of presentation <u>iff</u> and to that extent that S is able to Φ (badly/well).[43]

(12) and (13) yield an extensionally correct account. However, we should still regard it as second

rate. For, on the standard assumption that processes are individuated by of their objects, it would

still be the case that learning a skill and learning-how are on this view distinct processes (even if

covariant (Pavese, 2017a)), so long as skill is treated as a matter of ability, and know-how as a

matter of information possession. In this way, the process of learning a skill is relegated to the

level of developing muscle mass, a necessary and sufficient concomitant of acquiring knowledge,

perhaps, but ultimately external to the learning process.

For these reasons, I think neither intellectualism nor anti-intellectualism offer a fully

satisfying account of the nature of learning by doing. Although the problems are far from decisive,

they strike me as serious enough to warrant a search for alternatives. In closing, I should like to

briefly outline an alternative that, in its contours at least, may fare better.

To so much as put the view on the table, we need to reject a Rylean assumption that has

framed the modern debate, namely, the view that intellectualism and anti-intellectualism (as

defined) are contradictory positions that, as such, cover the whole conceptual terrain. That this is

a highly questionable assumption can be seen by considering a view such as John Hyman defends

about the nature of knowledge (1999, 2015). According to Hyman, knowing that p consists in

having a capacity to Φ for the reason that p (where Φ ranges over anything that can be done for

reasons, such as intentional actions). If you hold this position, you can be both an intellectualist

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[43] Pavese (2017a, pp. 375-378) appeals to a principle along these lines to explain the close connection between knowledge-how and ability. She defends it at length in Pavese (2018).

and an anti-intellectualist: for you can hold that knowing-how consists in knowing certain propositions, but this in turn will consist in having a set of capacities.[44]

Or, again, consider a view such as Evans (1981; 1982, ch.6) defended about the nature of demonstrative knowledge. Evans held that having demonstrative knowledge, consists in having certain capacities; in particular, capacities to keep track and appropriately react to information received from the object of one's knowledge (e.g. that object over there).[45] Now, Evans's appeal to capacities can hardly be considered a denial of the propositional character of demonstrative thought. On the contrary, he held that a characterization of the capacities that are employed in demonstrative thought just is a characterization of the sense constitutive of that thought. In other words, it is a characterization of the demonstrative concepts that constitute such propositional knowledge (e.g. knowledge that that object over there is moving).

A practical analogue of such a position would hold that having knowledge how consists in the possession of certain practical capacities, say, capacities to control an object in some characteristic way.[46] Like Evans, we could hold that the characterization of such capacities does not amount to a denial of the propositional character of practical thought but rather an elucidation of the concepts that make up this thought (cf. Peacocke (1992)). If such a position proved tenable, we would have the resources to explain the gradability of skill-acquisition in terms of the gradability of such capacities. Like anti-intellectualism, such a view could explain how there might

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[44] Waights Hickman (2019) independently develops this criticism.

[45] See Dickie (2010) for a development of this view that appeals to recent research on perceptual cognition.

[46] Brogaard (2011) develops a position along these lines, meant to show how propositional knowledge might be constituted by an ability. She argues that abilities are content-bearing states that can have epistemic warrant in virtue of features such as counterfactual success. In certain cases, she holds, these abilities might, like beliefs, constitute knowledge. Although this view shares important features with the view I am sketching, it is importantly different, because Brogaard takes the relevant abilities to be informational states available to beings incapable of forming beliefs, such as animals and infants (p.155). Thus, she seems to have in mind some form of non-conceptual content, whereas I am suggesting that the abilities in question are *conceptual* practical abilities. I cannot otherwise make sense of how the resulting knowledge would be propositional.

be a learning process that is constituted by the development of abilities, treating the acquisition of skill and the acquisition of knowledge-how as a single process. Yet, since these would be *conceptual* abilities, the view could explain why this is a genuine learning process—an acquisition of knowledge—in line with the experimental evidence suggesting that the process is drenched with cognition.

Ryle's criticism of intellectualism on the basis of gradability appears in the context of his discussion of practice:

> Learning *how* or improving in ability is not like learning *that* or acquiring information. Truths can be imparted, procedures can only be inculcated, and while inculcation is a gradual process, imparting is relatively sudden . . . 'Part-trained' is a significant phrase, 'part-informed' is not. (p.59)

The last alleged disanalogy is easily explained away by Pavese's question-centric framework: contra Ryle, it makes sense generally to speak of being 'partly informed' about questions and answers generally.[47] In the example above, someone is partly informed about where the Botero museum is.

On the other hand, the initial disanalogy is hard to explain just in terms of information-processing (Fridland, 2015, p. 722). Following Poston (2016) we can put the problem in terms of a disanalogy between the following two knowledge-transmission schemas:

Knowledge-that transmission schema:

A knows wh-Ψ.[48]

A tells *B* wh-Ψ.

So, *B* comes to know wh-Ψ.

Knowledge-how transmission schema

A knows how to Φ.

A tells *B* how to Φ.

So, *B* comes to know how to Φ.

The problem, according to Poston, is that the first is typically a good transmission schema, but the second is not. After all, (in the good case) if we tell someone where the Botero Museum is, that is enough for the listener to acquire the relevant knowledge. But just being told how to cook paella is not enough to learn how to cook it. Practice is needed. Thus, like Ryle, Poston suggests that intellectualism cannot explain this disanalogy, and should therefore be rejected.

Ryle and Poston have latched unto an important distinction, but they misdiagnose its nature. I shall use the Evans-inspired view outlined above to offer what I believe is the right explanation.

Begin by noting that, in fact, knowledge-how is often easily transmitted by testimony.[49] For instance, I can teach you how to open a certain medicine jar by telling you that you need to press the lid, and then twist it. Correspondingly, practice is crucial for the acquisition of certain forms of propositional knowledge. Only an inept elementary school teacher could think that students could learn the answer to 'what is 5x7?' simply by being told that it is 35. Like all of us, students will have to practice studiously to learn this, along the rest of the multiplication table. Hence, whatever the nature of the difference between the two schemas, it does not arise from a difference between knowledge-how and knowledge-that.

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[49] Including what Poston calls "non-deontic infinitival" knowledge-how (p.886). Poston is aware of this difficulty (p.870), but he seems unaware of the problem that acquisition of knowledge-that often also requires practice, resulting in the misdiagnosis.

The distinction is rather between what we may call *simple* and *complex* learning. In cases of *simple learning,* a speaker takes advantage of a listener's pre-existing conceptual capacities to impart information. By exercising these capacities, the listener grasps what is said and learns it, if she trusts that speaker. The transfer of knowledge about the location of the museum, and about how to open the jar is possible precisely because listener and speaker possess concepts such as MUSEUM, LID, and PRESS that make understanding through communication possible. By contrast, in cases of *complex learning*, the teacher aims to teach the student certain facts (such as how to sauté the onions and peppers for a sofrito, or what 5x7 is) by training the student in the very concepts needed to grasp them (such as the concept of SAUTÉING, or MULTIPLICATION). Learning by doing is a form of complex learning on the framework proposed: it is a process by which certain facts are gradually disclosed to a learner as she masters the concepts to grasp them.[50] Like other forms of concept acquisition (such as colour-concept acquisition), this one generally requires substantive experience with things that instantiate the concepts (or are appropriately related to them).[51] This answers the question from the introduction as to why we generally cannot attribute knowledge-how to someone who has never practiced an activity.

Much more would need to be said to properly develop this view, of course.[52] Yet, the results of this paper suggest a strategy to determine the shape that such an account should take, and thus to gain a better grip on the nature of knowledge-how. For we may look at the nature of practice and the capacities that empirical science shows to be gradually developed through this process to help us identify the capacities that, on the proposed view, would be constitutive of knowledge-

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[50] Following a rich tradition in philosophy and cognitive science, I assume that in the case of skills, the concepts will be distinctively practical (Gallese & Lakoff, 2005; Israel, Perry, & Tutiya, 1993; Pacherie, 2000; Pavese, 2021; Peacocke, 1986).

[51] This is a widely-held assumption that goes back to Aristotle (see Charles (2001)). See Cussins (1992) for an attractive story of how such concept-development takes place.

[52] I hope to do so in future work.

how. For those who remain committed to one or the other of the traditional positions, I hope the discussion has shown why it is important to provide an account of the nature of practice, and of the difficulties that emerge when we undertake this project from within the conceptual confines that have framed the debate since Ryle.[53]

References

Anscombe, G. E. M. ([1957] 1963). *Intention* (2nd ed.). Oxford: Basil Blackwell.

Beddor, B., & Pavese, C. (forthcoming). Practical Knowledge without Luminosity. *Mind*.

Bengson, J., & Moffett, M. A. (2011a). *Knowing How: Essays on Knowledge, Mind, and Action*: Oxford University Press USA.

Bengson, J., & Moffett, M. A. (2011b). Two Conceptions of Mind and Action: Knowledge How and the Philosophical Theory of Intelligence. In J. Bengson & M. Moffett (Eds.), *Knowing How: Essays on Knowledge, Mind, and Action* (pp. 3-55): Oxford University Press.

Bratman, M. (1999 [1987]). *Intention, Plans, and Practical Reason*: The David Hume Series: CSLI Publications.

Brogaard, B. (2011). Knowledge-how: A unified account. In J. Bengson & M. Moffett (Eds.), *Knowing How: Essays on Knowledge, Mind, and Action* (pp. 136-160): Oxford University Press.

Carr, D. (1979). The Logic of Knowing How and Ability. *Mind, 88*(351), 394-409.

Charles, D. (2001). Wittgenstein's Builders and Aristotle's Craftsmen. In D. Charles & W. Child (Eds.), *Wittgensteinian Themes: Essays in Honour of David Pears* (pp. 49-79). Oxford: Clarendon Press.

Cussins, A. (1992). Content, embodiment and objectivity: The theory of cognitive trails. *Mind, 101*(404), 651-688.

Davidson, D. (2001a). Agency. In *Essays on actions and events* (pp. 43-61). Oxford: Clarendon Press.

Davidson, D. (2001b). Intending. In *Essays on actions and events* (pp. 83-102). Oxford: Clarendon Press.

Dickie, I. (2010). We are acquainted with Ordinary Things. In R. Jeshion (Ed.), *New Essays on Singular Thought* (pp. 213-245): Oxford University Press.

Dowty, D. R. (2012). *Word meaning and Montague grammar: The semantics of verbs and times in generative semantics and in Montague's PTQ*. Dordrecht: Kluwer.

Evans, G. (1981). Understanding demonstratives. In H. Parret (Ed.), *Meaning and Understanding* (pp. 280--304): Clarendon Press.

Evans, G. (1982). *The varieties of reference*. Oxford: Oxford University Press.

Ford, A. (2016). On What Is in Front of Your Nose. *Philosophical Topics, 44*(1), 141-161.

Fridland, E. (2014). They've lost control: reflections on skill. *Synthese, 191*(12), 2729-2750.

Fridland, E. (2015). Knowing-how: Problems and considerations. *European Journal of Philosophy, 23*(3), 703-727.

Fridland, E. (2019). Longer, smaller, faster, stronger: On skills and intelligence. *Philosophical Psychology, 32*(5), 759-783.

Gallese, V., & Lakoff, G. (2005). The brain's concepts: the role of the sensorimotor system in reason and language. *Cognitive Neuropsychology, 22*(3), 455-479.

Glick, E. (2015). Practical Modes of Presentation. *Noûs, 49*(3), 538-559.

Hampshire, S. (1983). *Thought and Action*: University of Notre Dame Press.

Hawley, K. (2003). Success and Knowledge-How. *American Philosophical Quarterly, 40*(1), 19-31.

Hornsby, J. (2011). Ryle's Knowing how and knowing how to act. In J. Bengson & M. A. Moffett (Eds.), *Knowing How: Essays on Knowledge, Mind, and Action* (pp. 80): Oxford University Press.

Hornsby, J. (2016). Intending, knowing how, infinitives. *Canadian Journal of Philosophy, 46*(1), 1-17.

Hyman, J. (1999). How knowledge works. *The philosophical quarterly, 49*(197), 433-451.

Hyman, J. (2015). *Action, Knowledge, and Will*: OUP Oxford.

Israel, D., Perry, J., & Tutiya, S. (1993). Executions, Motivations, and Accomplishments. *The Philosophical Review, 102*(4), 515-540.

Kearns, S. (2020). Meno, Know-How: Oh No, What Now? *Australasian Journal of Philosophy*, 1-14.

Kremer, M. (2017a). A Capacity to Get Things Right: Gilbert Ryle on Knowledge. *European Journal of Philosophy, 25*(1), 25-46.

Kremer, M. (2017b). Ryle's "Intellectualist Legend" in Historical Context. *Journal for the History of Analytical Philosophy, 5*(5), 16-29.

Kumar, V. (2011). In support of anti-intellectualism. *Philosophical Studies, 152*(1), 135-154.

Lavin, D. (2013). Must There Be Basic Action? *Noûs, 47*(2), 273-301.

Lehmann, A. C., & Ericsson, K. A. (1997). Research on expert performance and deliberate practice: Implications for the education of amateur musicians and music students. *Psychomusicology: A Journal of Research in Music Cognition, 16*(1-2), 40.

Levy, N. (2017). Embodied savoir-faire: knowledge-how requires motor representations. *Synthese, 194*(2), 511-530.

Lewis, D. (1973). Causation. *Journal of Philosophy, 70*(17), 556-567.

Mele, A. R., & Moser, P. K. (1994). Intentional action. *Noûs, 28*(1), 39-68.

Montero, B. G. (2016). *Thought in action: Expertise and the conscious mind*: Oxford University Press.

Newstead, A. (2006). Knowledge by Intention? On the Possibility of Agent's Knowledge. In S. Hetherington (Ed.), *Aspects of Knowing* (pp. 183): Elsevier Science.

Pacherie, E. (2000). The content of intentions. *Mind & Language, 15*(4), 400-432.

Pavese, C. (2015). Practical Senses. *Philosophers' Imprint, 15*.

Pavese, C. (2016). Skill in epistemology II: Skill and know how. *Philosophy Compass, 11*(11), 650-660.

Pavese, C. (2017a). Know-How and Gradability. *Philosophical Review, 126*(3), 345-383.

Pavese, C. (2017b). A Theory of Practical Meaning. *Philosophical Topics, 45*(2), 65-96.

Pavese, C. (2018). Know-how, action, and luck. *Synthese, 198*(Suppl 7), 1595-1617.

Pavese, C. (2021). Practical concepts and productive reasoning. *Synthese*, 1-30.

Peacocke, C. (1986). *Thoughts: An Essay on Content* (Vol. 98): Blackwell.

Peacocke, C. (1992). *A study of concepts*: The MIT Press.

Piñeros Glasscock, J. S. (2020). Practical Knowledge and Luminosity. *Mind, 129*, 1237-1267.

Piñeros Glasscock, J. S. (ms). Practical Intellectualism.

Poston, T. (2016). Know How to Transmit Knowledge? *Noûs, 50*(4), 865-878.

Pritchard, D. (2007). Anti-luck epistemology. *Synthese, 158*(3), 277-297.

Pritchard, D. (2008). Sensitivity, safety, and anti-luck epistemology. In J. Greco (Ed.), *The Oxford Handbook of Skepticism*: Oxford University Press.

Pritchard, D. (2009). Safety-Based Epistemology: Whither Now? *Journal of Philosophical Research, 34*, 33-45.

Rödl, S. (2007). *Self-consciousness*: Harvard University Press.

Rödl, S. (2011). Forms of practical knowledge and their unity. In A. Ford, J. Hornsby, & F. Stoutland (Eds.), *Essays on Anscombe's Intention*: Harvard University Press.

Rothstein, S. (2008). *Structuring events: A study in the semantics of aspect* (Vol. 5): John Wiley & Sons.

Ryle, G. (1949). *The Concept of Mind*: University of Chicago Press.

Ryle, G. (1971). Teaching and training. In *Collected Papers: 1929-1968* (pp. 451-464): Hutchinson & Co.

Setiya, K. (2008). Practical knowledge. *Ethics, 118*(3), 388-409.

Setiya, K. (2012). Knowing How. *Proceedings of the Aristotelian Society, 112*(3), 285-307.

Shepherd, J. (2021). *The shape of agency: Control, action, skill, knowledge*: Oxford University Press, USA.

Small, W. (2012). Practical Knowledge and the Structure of Action. *Rethinking Epistemology, 2*, 133-228.

Small, W. (2014). The Transmission of Skill. *Philosophical Topics, 42*(1), 85-111.

Sosa, E. (1999). How to defeat opposition to Moore. *Noûs, 33*(s13), 141-153.

Sosa, E. (2000). Skepticism and Contextualism. *Noûs, 34*(1), 1-18.

Srinivasan, A. (2015). Normativity without Cartesian privilege. *Philosophical Issues, 25*(1), 273-299.

Stanley, J. (2011a). *Know How*: Oxford University Press.

Stanley, J. (2011b). Knowing (How). *Noûs, 45*(2), 207 - 238.

Stanley, J., & Williamson, T. (2001). Knowing how. *Journal of Philosophy, 98*(8), 411-444.

Stanley, J., & Williamson, T. (2017). Skill. *Noûs, 51*(4), 713-726.

Stathopoulos, A. (2016). Knowing Achievements. *Philosophy, 91*(03), 361-374.

Stout, R. (2018). Ballistic Action. In R. Stout (Ed.), *Process, Action, and Experience*. Oxford: Oxford University Press.

Tenenbaum, S. (2021). *Rational Powers in Action: Instrumental Rationality and Extended Agency*: Oxford University Press.

Thompson, M. (2011). Anscombe's Intention and practical knowledge. In A. Ford, J. Hornsby, & F. Stoutland (Eds.), *Essays on Anscombe's Intention*: Harvard University Press.

Waights Hickman, N. (2019). Knowing in the "Executive Way": Knowing How, Rules, Methods, Principles and Criteria. *Philosophy and Phenomenological Research, 99*(2), 311-335.

Williamson, T. (2000). *Knowledge and its Limits*: Oxford University Press.

Winstein, C. J., & Kay, D. B. (2015). Translating the science into practice: shaping rehabilitation practice to enhance recovery after brain damage. In *Progress in brain research* (Vol. 218, pp. 331-360): Elsevier.

Wolfson, B. (2012). Agential Knowledge, Action and Process. *Theoria, 78*(4), 326-357.

Wu, W. (2016). Experts and Deviants: The Story of Agentive Control. *Philosophy and Phenomenological Research, 92*(2), 101-126.

Wymbs, N. F., Bassett, D. S., Mucha, P. J., Porter, M. A., & Grafton, S. T. (2012). Differential recruitment of the sensorimotor putamen and frontoparietal cortex during motor chunking in humans. *Neuron, 74*(5), 936-946.