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Case Study Evidence for an Irreducible Form of Knowing How to: An Argument Against a Reductive Epistemology

Garry Young

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Abstract Over recent years, there has been a resurgence of interest in arguments favouring intellectualism—the view that Ryle's epistemic distinction is invalid because knowing how is in fact nothing but a species of knowing that. The aim of this paper is to challenge intellectualism by introducing empirical evidence supporting a form of knowing how that resists such a reduction. In presenting a form of visuomotor pathology known as visual agnosia, I argue that certain actions performed by patient DF can be distinguished from a mere physical ability because they are (1) intentional and (2) knowledge-based; yet these actions fail to satisfy the criteria for propositional knowledge. It is therefore my contention that there exists a form of intentional action that not only constitutes a genuine claim to knowledge but, in being irreducible to knowing that, resists the intellectualist argument for exhaustive epistemic reduction.

Keywords Knowing how · Knowing that · Propositional knowledge · Reductive epistemology · Intellectualism · Visual agnosia

Introduction

From the moment Ryle (1949) first distinguished between *knowing how* and *knowing that*, philosophers have argued over the legitimacy of this distinction—whether it can be sustained or whether one type of knowledge is ultimately reducible to the other[1] (see Gellner 1951; Ammerman 1956; Hartland-Swann 1956; Scott 1971; Carr 1981; Upadhyaya 1982; Williamson 2000) for a small selection of

[1]For a discussion on the historical roots of this distinction, see Moran (2005).

G. Young (✉)
Division of Psychology, Nottingham Trent University, Nottingham, UK
e-mail: garry.young@ntu.ac.uk

puplications on this issue). *Intellectualism*, for example, holds that all knowing how is simply a species of knowing that. More formally:[2]

S knows how to G *iff* S possesses propositional knowledge regarding G.

Alternatively, and in opposition to both Ryle's dichotomy and the direction of the reduction, strong anti-intellectualism asserts that knowing that is in fact nothing but a species of knowing how (traditionally a less popular view that will not feature in this article). Finally, *weak anti-intellectualism* (the most faithful to Ryle's position) maintains that each species of knowledge is independent of the other.[3]

Recently, there has been a resurgence of support for intellectualism. Stanley and Williamson (2001), for example, claim that all forms of knowing how can be reduced to knowing that. Similarly, Snowdon (2003), using a selection of illustrated examples, questions the validity of Ryle's original dichotomy, and explores alternatives for replacing it. Like Stanley and Williamson, he concludes that knowing how, when re-configured, is simply a form of knowing that (or propositional knowledge).[4]

The aim of this paper is not to discuss in detail the various attempts that have made over the years to support or refute Ryle's epistemic distinction. Instead, its aim is to challenge the intellectualist view, epitomised by Stanley and Williamson, and in particularly Snowdon, that knowing how is simply a species of propositional knowledge, and therefore that Ryle's original dichotomy is somehow invalid. To meet this aim, I employ a less conventional approach than my predecessors. Using case study evidence for the retained visuomotor abilities of patient DF, who suffers from visual agnosia, I argue that there exists a species of knowing how (or procedural knowledge) that is in fact irreducible to knowing that (I therefore aim to adopt a weak anti-intellectualist position). More specifically, it is my view that DF and similar patients are able to engage with their environments, in a manner that is distinguishable from a mere physical ability to G, precisely because their movements are knowledge-based; but, importantly, these movements do not meet the necessary or sufficient criteria for propositional knowledge (the details of which I will outline in "The Knowledge Claims" section).

The case study approach is useful, I contend, because it demonstrates in controlled terms the extent to which patient DF is *unable* to meet these criteria, as well as the extent to which she is nevertheless able to act *intentionally* with regard to G (another important component in the attribution of procedural knowledge). The advantage of the case study approach over more traditional examples of subjects allegedly demonstrating irreducible procedural knowledge—such as pre-verbal infants and animals—will also be discussed. In short, the alleged ability of DF to act intentionally in the absence of the means of satisfying the criteria for propositional knowledge will be used as evidence against intellectualism, and in support of the conclusion that there exists an irreducible form of knowing how that underpins not only the intentional actions of patients with pathologies like DF, but

[2] Adapted from Bengson et al. (2008).

[3] See Fantl (2008) for a more detailed discussion on each of these positions.

[4] See Koethe (2002); Rumfitt (2003); Rosefeldt (2004); Noë (2005) for criticisms.

the intentional actions of each and everyone of us. Before moving on to defend this claim, however, I will begin with a brief outline of intellectualism, as presented by Snowdon.

Snowdon's Intellectualism: Against the Standard View

Snowdon (2003, p.2) presents us with what he calls the *Standard View*—a view he intends to challenge. It comprises two separate but interrelated theses.

(1) The Distjointness Thesis: Knowing how does not consist in knowing that some proposition is true or that some fact obtains; knowing how cannot be reduced to or equated with (any form of) knowledge that.
(2) The Capacity Thesis: Knowing how to G does in fact consist in being able to G, in having the capacity to G. Knowing how ascriptions ascribe abilities or capacities to do the mentioned action.

We are told that each of these can be found (even if it is not explicitly stated) in Ryle's argument for distinct types of knowledge.

Thesis (1) is compatible with the weak anti-intellectualism I am defending here. Thesis (2), for its part, is a variation on what Bengson et al. (2008) refer to as Neo-Ryleanism, namely:

> S knows how to G *iff* S possesses a certain sort of ability to G

What thesis (2) and Neo-Ryleanism have in common is the attribution of ability as a necessary and sufficient condition for knowing how. Before considering this further, however, let us first discuss Snowdon's challenge to thesis (1). Snowdon begins by drawing our attention to the fact that we typically employ a number of different knowledge terms when ascribing knowledge relations. More often than not, we will ascribe to someone knowledge of *why* something is the case, or of knowing *when* or *where* something is, or *whether* or *to whom* it belongs.[5] Why, then, do we not contrast these knowledge ascriptions with propositional knowledge? For Snowdon, it is because despite constituting different knowledge relations, each is ultimately a form of knowing that. Knowing when *x* will occur, for example, amounts to nothing more than knowing that *x* will occur at such and such a time and, conversely—I suspect—that it will not occur at a different time.

> [T]hese other 'know…to…' ascriptions neatly fit the standard treatment of them as indirect ascriptions of knowing that. (p.7)

This means that thesis (1) cannot be applied to knowledge ascriptions such as knowing what, or where, or to whom, because they are each reducible to knowing that some proposition or other is true.[6]

[5] These are sometimes referred to as cases of knowing-*wh*.

[6] At this stage in the paper, I am willing to allow Snowdon his reduction of these alternative knowledge ascriptions to knowing that. However, later I will query whether this is in fact the case with all forms of knowing-*wh*. In particular, I will question whether knowing where is always reducible.

According to Snowdon, knowing how is no different; it too should be subject to the same treatment as knowing what, or where, or to whom. For knowing how Houdini was able to escape from a locked box is simply a case of knowing *that* he did such and such: it is equivalent to knowing facts pertaining to his escape. Even knowing *how to*, which Snowdon concedes is a more performance- and less factually-based form of knowledge ascription, fails to escape. Knowing how to is "a kind of knowledge which is pressed into service in action" (Hornsby and Stanley 2005, p.113). But, equally, or so the argument goes, "[k]nowledge for which the primary evidence is a person's performance… is to know the answer to questions concerning the way in which it can be done" (Brett 1974, p.923). In other words, by knowing how to proceed, I know *that* such and such must be done (Brown 1971). According to Hornsby and Stanley (2005), then, the reduction of procedural knowledge to knowing that demonstrates that Ryle's dichotomy is "clearly false" (p.113). Snowdon is likewise resolute in his reductionism, and likewise critical of any thesis which involves "rather uncomfortably, treating 'knowing how to' as the one exception to a uniform and highly plausible treatment of all other cases" (2003, p.8).

This argument is valid if we allow that all forms of procedural knowledge amount to nothing more than knowing propositional facts about how to proceed. However, Hornsby and Stanley recognise that "[t]here are things which we are inclined to say the agent is able *to simply do*" (2005, p.114). Does this concession pave the way for an irreducible form of knowing how to? Not according to Snowdon who would hold Hornsby and Stanley's assertion to be compatible with his challenge to thesis (2) (the capacity thesis).

Essentially, Snowdon disagrees with the claim that knowing how to G and one's capacity to G are necessarily connected, such that knowing how to G entails being able to G and, conversely, being able to G entails knowing how to G. Bengson and Moffett (2007) provide an example to illustrate this lack of entailment. (It is also worth noting that 'capacity' and 'ability' seems to be used as interchangeable terms in much of the literature. I, however, favour the term 'ability'.)

1. Irina [an ice-skater] knows how to do a quintuple salchow.
2. Irina is able to do a quintuple salchow
3. Irina knows how to do a quintuple salchow, but is unable to do one. (p.32)

In this example, it would seem that Irina could satisfy 1 and 2 without each necessarily entailing the other, as is demonstrated by 3.[7] Similarly, Bengson and Moffett note that if S understands how to G then S knows how to G, but S can understand how to G without being able to G.[8] Thus, from these examples, we can distinguish between one's lack of ability to G and one's knowing how to G without creating "epistemic tension" (p.34).

I find this aspect of Snowdon's opposition to the Standard View less problematic and am, in many respects, sympathetic to it, although I still feel it needs further qualification. To illustrate: It could be argued that when saying that Irina knows how

[7] See Williams (2008) for further examples of this lack of entailment.

[8] I have adapted this example slightly from the original, so that it is consistent with my own terminology.

to G (do a quintuple salchow) we mean that Irina knows facts pertaining to the performance of G—she knows that such and such is required—but in saying that she lacks the ability to G, we mean she lacks a certain know-how of a kind constituting something other than knowledge of facts pertaining to G. Within such an argument, "knowing how to" appears to be referring to two species of knowledge. On the one hand, it refers to facts pertaining to the performance of G, and on the other hand to some form of motor knowledge—essentially, to a skill.[9] To understand why I am reluctant to relegate Irina's lack of ability in this example to something other than a lack of a certain knowledge-based performance (or skill), consider how the use of ability in this context compares to the following examples—which I am willing to concede *do* demonstrate that ability and knowing how to lack necessary connection. We would not want to claim, for example, that we know how to blink, or to digest food, or as a consequence of digestion, know how to excrete waste.

What separates these examples of ability from the ability (*qua* skill) that Irina lacks is well expressed by Noë (2005): "Digestion is not an action that a person or animal can perform; it is a process that takes place inside a person or animal" (p.279). Thus, someone may have excellent digestion, but we would not want to say that they are good at digesting. Demonstrating one's ability to digest is not, therefore, something one can intend or fail to intend to do. As such, the presence of, or even the possibility for, intention is an important addition to our discussion on whether there exists an irreducible form of know-how. Intention amounts to a critical distinction between what I characterised earlier as a skill (something I can intentionally demonstrate) and mere physical ability (something I am able to do irrespective of intent).[10] With this distinction in mind, perhaps it is possible to accept the validity of Snowdon's claim whilst upholding an amended thesis (2)—notably, that if one is able to G *intentionally* then it follows that one knows how to G. I realise that the term 'intentionally' is doing a lot of work here and needs to be unpacked. This I will do in the "Patient DF: Evidence for Irreducible Procedural Knowledge" section. In the meantime, let us reconsider thesis (2) of the Standard View in light of this amendment:

(2*) Knowing how to G does in fact consist in being able to G (where G is an *intentional* act). Knowing how ascriptions ascribe abilities to do the mentioned (intentional) action

With this additional requirement in place, does thesis (2*), and with it the Standard View, constitute a genuine knowledge relation that involves an irreducible form of knowing how to? In other words, are knowing how to G and one's ability to G (where G is an intentional action) necessarily connected? And, if so, does the necessary connection signify a form of knowledge that is

[9] I accept that a skill requires ability. But such a requirement does not entail that skill and ability are the same. I thank Paul Gilbert (University of Hull) for drawing my attention to the appropriateness of the term in this context.

[10] By using the phrase "mere physical ability", I do not intend 'ability' to be synonymous with 'mechanistic'. I recognise that 'ability' has a normative (and therefore non-physical) component, even in the case of digestion or waste excretion. There is a standard or norm, arguably shaped by evolution (in these cases) that must be met in order for an ability to be demonstrated. For an informative discussion on the differences and similarities between capacity, ability and disposition, see Millikan (2000).

irreducible to factually-based propositions (as required by thesis 1)? In order to answer these questions, we must first consider what is required for an action to satisfy thesis (2*).

First and foremost, it must be distinguishable from simply possessing the physical ability to respond, or even (as we shall discuss later) accidental success. However, such a distinction would seem to require antecedent, or at least co-existing, knowledge that: for in order to know how to G, I must also know that such and such is required in order to achieve G. Moreover, my intention to G must be informed by such knowledge, otherwise my intention would be groundless.[11] Such a requirement is perfectly compatible with the weak anti-intellectualism I am advocating here. The inclusion of propositional knowledge as a means of establishing intent and thereby distinguishing knowing how to G from the mere physical ability to G does not require that knowing how and knowing that are one and the same species of knowledge, and therefore that the former is reducible to the latter. Instead, it requires only that the subject's response (the putative demonstration of knowing how to G) should fail to meet the requirements for propositional knowledge.

In the next section, I outline what these requirements are by presenting three different claims to knowledge. The first two describe sufficient conditions for a reduction of knowing how to knowing that, with the second also constituting a necessary condition. In addition, I illustrate how, typically, knowing how to ascriptions are reducible to at least one of these knowledge claims. Thus I concede that, in most cases, knowing how to G does not amount to a distinct species of knowledge irreducible to knowing that. I then present the third (minimal) claim to knowledge which, I contend, is satisfied by the retained visuomotor abilities of visual agnosia patient DF (who will be discussed in the "Patient DF: Evidence for Irreducible Procedural Knowledge" section). DF's responses, I will argue, are distinguishable from a mere physical ability to G, because of the presence of intention; yet they fail to satisfy either of the conditions for knowing that, as detailed in the first two knowledge claims.

The Knowledge Claims

Those in favour of reducing procedural knowledge to knowing that often support their argument with examples of protagonists expressing their know-how in a form reducible to propositions. To re-use my earlier example: knowing how Houdini was able to escape from a locked box is simply a case of knowing that he did such and such. Consider, then, the first of three knowledge claims.[12]

(K.C.1) For subject S to be attributed with knowing how to G, S must be able to *articulate* why it is that performance *p* constitutes G (and 'other than *p*' does not)

[11] I am not suggesting here that an exhaustive knowledge of the particulars of how to G must be known, only (as I will discuss later) that the subject knows that the performance s/he initiates is known to constitutes an appropriate (preferably the best) means of achieving G.

[12] For an earlier discussion on the knowledge claims presented here, see Young (2004)

This first claim to knowledge, I accept, is nothing more than a reformulation of the intellectualist claim that, S knows how to G if and only if S possesses a certain sort of propositional knowledge regarding G. To illustrate how (K.C.1) might manifest itself, consider Felix, a concert pianist who, in knowing how to play the piano, is able to articulate the particulars of a given performance. In simple terms, he is able to say what constitutes aspects of piano playing and what does not. In knowing how to play an F major scale, for example, Felix is able to articulate that a B^b should be played rather than B (and with this rather than that finger). He knows that B^b in this context constitutes a note of the F major scale, whereas B does not. Felix's know-how amounts to knowledge that certain facts pertain to appropriate piano playing and certain facts pertain to inappropriate piano playing.

This example illustrates the legitimate reduction of a certain form of know-how to propositionally constituted knowing that. (K.C.1) is a sufficient claim to knowledge, as Snowdon attests:

> [I]t makes a denial of the knowledge ascription very hard when the subject can, apparently, convey the relevant information to someone else. (pp.9–10)

But is it necessary? I do not believe so, and neither, it would seem, does Snowdon.

> There is no assumption here that the presence of knowledge entails that it can be passed on by the knower… (p.9)[13]

Felix can articulate what is required to play an F major scale and, let us say, any other aspect of piano playing. This he can do even with dysfunctional hands; or in fact with no hands at all. However, something important seems to be missing from Snowdon's claim. Suppose that subject S is unable to articulate the particulars of an appropriate performance; might it nevertheless be sufficient for him to experience a particular action as "feeling right", and as a result still claim knowledge of how to G?[14] To answer this question, consider the second knowledge claim.

(K.C.2) For subject S to be attributed with knowing how to G, S must be able to *experience* performance *p* as appropriate to G (and, conversely, 'other than p' as inappropriate)

This knowledge claim does not require the subject to be able to articulate, in propositional terms, the particulars of doing G, as demanded by (K.C.1), but rather credits him with knowledge of how to G in virtue of the link his *experience* forges with intentional action. It is perfectly feasible that Felix, with no formal understanding of music, could claim to possess certain know-how regarding appropriate piano playing based simply on the experience of what is performed

[13] I believe this point also rules out the possibility of using 'teachability' as a suitable measure of a subject's know-how. Not being able to pass on this knowledge does not mean that the would-be teacher is unable to demonstrate know-how themselves. In addition, a lack of 'teachability' raises the question as to whether what is missing is knowledge of how to G, for example, or knowledge of how to teach another (or even just *this* person) how to G. As Polanyi (1966) notes: "…what the pupil must discover by an effort of his own is something we could not tell him. And he knows it in his turn but cannot tell it." (p.5)

[14] By 'feeling right', I also include 'looking right' or 'sounding right' etc.

"sounding nice". Felix's experiential content is sufficient, then, to guide movement and where necessary make adjustments within a given performance. It may be, however, that Felix is able to articulate the particulars of the performance to a limited degree—the reason why *that* note was (or should be) played is because it sounds better/nicer than *this* one, for example—which would then feed into his reason-giving explanation: but this is not a strict requirement. Instead, to satisfy (K.C.2), all that is required is that experiential content guide intentional performance[15]—in this case, the experience of one note sounding 'nicer' than another.[16] Felix can still know that G_1, $G_2 \ldots G_n$ are required because this is what he experiences. Therefore, even if his experience is not articulable in propositional terms, it still constitutes a form of knowing that because it can be used to guide a performance towards G rather than other than G, and in doing so be the means by which G (and not 'other than G') is expressed as most appropriate.

Neither (K.C.1) nor (K.C.2) challenges Snowdon's claim that knowing how to is simply a form of knowing that. Felix's knowing how to play the piano is grounded in either propositional terms, by knowing that a B^b should be played instead of a B or that *that* note is better than *this* one, or at a minimal level by simply experiencing one note as more appropriate than another. It is also not clear from the description of Felix whether he is actually playing the piano himself; it could be argued, therefore, that the know-how demonstrated by Felix is independent of any ability (*qua* skill) he may possess to play the piano. Certainly this is true for those forms of know how that satisfy each of the knowledge claims so far discussed. However, it has been my contention throughout this paper that the lack of necessary connection between such reducible forms of knowing how to G and one's ability to G does not inevitably lead to a claim that all demonstrations of ability (e.g. skills) are necessarily independent of a claim to knowledge, particularly when G is intentionally performed. In keeping with this contention, suppose that evidence is available in support of an intentional action the particulars of which are neither articulable in propositional terms nor, importantly, experienced as being appropriate by the subject: in fact, they are not experienced at all. If evidence could be found to support the description of a subject's action as intentional, rather than as an expression of a mere physical ability, but which fits neither (K.C.1) nor (K.C.2), then it is my further contention that we would have evidence for a form of knowing how to G that is distinct from other reducible forms of procedural knowledge.

This conclusion requires the successful resolution of three related issues. First, that it can be established that subject S is performing *p* intentionally. Second, that

[15] I recognise that I am riding somewhat roughshod over issues relating to the causal efficacy of experiential (qua representational) content. I am only suggesting here that, for the sake of argument, this position could be adopted by the intellectualists.

[16] An objection to the claim that experience is sufficient to guide knowledge-based movement might be: Suppose the subject experiences the notes as 'sounding nice', and therefore as appropriate, even though others judge them to be inappropriate. Under such conditions would it not in fact be legitimate to say that the subject does not know how to play the piano? In response, consider the man who rides a bicycle by sitting backwards on the seat and pedals backwards in order to move forwards. It might be claimed that his performance is inappropriate but would we want to say, in addition, that it is not something he knows how to do?

performing *p* intentionally constitutes knowledge of how to G. Third, that this knowledge cannot be reduced to a species of knowing that. In response to the first of these points, in the next section I will argue that subject S—that is, DF—is performing *p* intentionally simply because her performance adheres to the instructions she is given: instructions she intends to follow. Moreover, and in response to the second point, adherence to the instructions not only distinguishes performance *p* from a mere demonstration of a physical ability, but also conforms to a form of knowing how to precisely because it was a *successfully executed* intentional action. However, in order to distinguish this form of know-how from other reducible forms of procedural knowledge, we must first consider the third and final claim to knowledge.

(K.C.3) For subject S to be attributed with knowing how to G, S must be able to perform *p* rather than other than *p*, where *p* is an intentional means of G*ing*

(K.C.3) constitutes a minimal and irreducible form of knowing how to that can occur in the absence of the conditions required to satisfy either of the two previous claims to knowledge. (K.C.3) allows that subject S knows how to G if she performs *p* intentionally, even when unable to articulate or experience the particulars of *p* as a means of G*ing*. To establish the validity of this final claim to knowledge, I will present in the next section the preserved visuo-motor abilities of visual agnosia patient DF.

Patient DF: Evidence for Irreducible Procedural Knowledge

DF's vision is so profoundly impaired that she is unable to consciously experience objects at all. Instead, when looking at an object, she experiences only a mixture of its colour(s) and texture(s). In research carried out by Goodale et al. (1991), DF was asked to match the orientation of a slot placed in front of her by mirroring its position with her hand (the slot could be manoeuvred through 360°).[17] Over a series of trials, in which the orientation of the slot was changed, her estimation was no better than chance. However, when instructed to place a letter through the slot, her performance showed a level of accuracy comparable to that of controls. In other words, despite not being able to indicate accurately the slot's position with her hand, DF was nevertheless able to consistently place the letter through the slot, whatever its orientation, in a manner indistinguishable from controls. In light of this, should we conclude that DF *knows how to* place the letter through the slot?

Before answering this question, imagine that I am present during DF's first ever performance on the postal slot task. I might be forgiven for thinking that her success was simply a case of beginner's luck. Yet even in the case of luck, I would still have to concede that she possesses the physical ability to complete the task. She is clearly able to move in the required way, irrespective of whether the outcome was

[17] For an update on research relating to DF, see Goodale and Milner (2004)

fortuitous. Perhaps her success is analogous to the novice dart player who, with his first ever dart, hits the required target—the bull's eye. The novice, like DF, has the physical ability to carry out the task, but would we want to declare that hitting the bull's eye is something the novice knows how to do (and therefore is a skill he possesses), even if this was something he intended to at least try to do?[18] There is a danger that (K.C.3) forces us to draw just such a conclusion. After all, according to this third claim to knowledge, performing *p* (where *p* is an intentional means of G*ing*) is a measure of know-how. Therefore, if DF or the novice dart player's intention was to try to G, and in trying they succeeded, then should we not conclude that, in successfully performing *p* (and avoiding performing other than *p*) they have demonstrated a certain type of know-how? Not according to Hawley (2003), who maintains that success *per se* is neither necessary nor sufficient for a claim to knowledge. Success is not sufficient if one succeeds only once, as was the case with the novice dart player; but, importantly, neither is repeated success necessary: for it could be the case that I know how to G even if I do not succeed in G*ing* every time. After all, not even David Beckham succeeds in 'bending it like Beckham' on each occasion.[19] For Hawley, what is necessary for know-how is not exhaustive success but, rather, reliable success. With this in mind, perhaps we should amend (K.C.3) accordingly.

(K.C.3*) For subject S to be attributed with knowing how to G, S must be able to perform *p, reliably,* rather than other than *p*, where *p* is an intentional means of G*ing*

Of course, it could be argued that the vast majority of us 'succeed' at breathing, or digesting food, or excreting waste: these are things we consistently do, and their success and reliability are measured against a backdrop of normative evolutionary function. But as pointed out by Noë earlier, we would be reluctant to credit ourselves with knowledge of how to perform these tasks, for they are merely examples of processes or happenings, not intentional acts. This view is echoed by Hawley when she states: "success cannot amount to knowledge how unless intentional action is involved" (2003, p.26). For Hawley, then, to exhibit know-how, the subject must understand (1) that she has succeeded in doing G (in other words, she must be aware that what she has done constitutes successful G*ing*), and (2) that her performance *p* constitutes a good way of achieving the goal of doing G (she must be aware of the connection between her chosen method and the best (or at least an appropriate) method of achieving G).[20]

Conditions (1) and (2) seem compatible with (K.C.1) and (K.C.2). Both my awareness of success when performing G and my awareness of the fact that my chosen method is appropriate to achieving G are implied within each of these

[18] I borrow this example from Carr (1979)

[19] Hutto (2005) also notes that actions that exhibit know-how, in the form of a certain ability (or what I would call 'skill'), do not require this ability to be "infallible" (p.390).

[20] I do not wish to make condition (ii) too demanding. The subject simply needs to be aware that the method is appropriate; this appropriateness can be based on cultural norms, or be quite idiosyncratic—appropriate (as in, it works) for me.

respective claims to knowledge. It may be that I am able to articulate this awareness (a requirement of K.C.1) or, instead, that I simply experience it as such (as required by K.C.2); either way, it seems that the species of knowing how that is able to satisfy Hawley's conditions likewise satisfies in some form or other at least one of the first two knowledge claims.

Returning to DF: her success at the postal slot task is remarkably consistent, thus supporting the claim that she demonstrates reliable success. But does DF's success satisfy each of Hawley's conditions? As DF completes her performance, she is aware of the letter correctly passing through the slot—thus satisfying condition (1). However, DF and patients with related pathologies, such as those suffering from blindsight (see Weiskrantz 1986, 1997), are often amazed, initially at least, by their success. A point endorsed by Grunbaum (2008) whilst discussing the performance of a blindsight patient:

> If she has no perceptual contact with her environment, her motor behaviour, the grand level of her intentional engagement with the world, will appear to her as unintelligible, and its success as a matter of pure luck. (p.251)

The fact that blindsight patients and even those suffering from visual agnosia believe that what they are doing is simply 'guessing' suggests that each fails to satisfy condition (ii). As they grow accustomed to their success, however, they are less likely to attribute it to guess work (a point I shall return to).

So is DF aware of the connection between her chosen method and some appropriate method of achieving G? Yes, in so far as she understands that performance *p* is an attempt to satisfy her intention to obey the command "Place the letter through the slot", even if, initially at least, she considers such an attempt pointless. In other words, she knows, generally, what is involved in posting a letter through a slot and what is not (I *know that* I should reach forward rather than, say, lift my hand up in the air). DF is therefore aware that her performance is intentional in so far as it is *intended* to comply with the researcher's request, and she knows that reaching forward is an approximate means of achieving this.[21] However, in light of DF's visual agnosia, the degree to which it can be claimed that she is aware of the more specific details[22] of the match between her chosen method and some appropriate method of achieving G is questionable. In fact, I would go so far as to say, no, she is not, nor can she be aware of this.

To Explain: We know that DF lacks conscious awareness of the position of the slot. In what sense, then, is she able to connect her chosen method of execution with an appropriate method of posting the letter? Her initial sense of pointlessness would

[21] Apart from DF's lack of ability to consciously perceive objects (as objects), she is, of course, in all other respects 'normal'. She is aware of her condition, and of what the researcher is asking her to do, and of the supposed mismatch between task and ability. Her initial surprise at the request is testament to this. Therefore, however reluctant she may be (initially, at least) to perform action *p*, her initiation of the action conforms to the requirements of the command, as best she understands it. It is this compliance that makes performance *p* intentional, and distinguishes it from, say, digesting food.

[22] By "more specific details", I simply mean a conscious awareness of the slot's orientation that see will have to mirror in order to post the letter. I certainly do not require DF to be aware of precise angles of orientation, or trajectory, which would be beyond most (if not all) of us to articulate.

seem to indicate that she is not *aware* of knowing how to carry out this task *qua* knowing what specifically to do—other than knowing how to reach forward with a letter *as if* to post it. But this is not the same thing. At most it is compatible with the general awareness she has of her performance's compliance with the researcher's command (as mentioned earlier). There is no specific information contained within the command "Place-the-letter-through-the-slot" to indicate how this is to be achieved. Perhaps DF's intention is simply to indulge the experimenter by *reaching forward* in a half-hearted attempt to post the letter. After all, DF knows how to reach forward! This know how, I accept, can be reduced to knowing that—she knows *that* reaching forward entails doing such and such, and knows that such action complies with at least the attempt to obey the command. But knowing facts pertaining to how to reach forward does not explain her continued success on the postal-slot task. To understand why, let us allow that her intention is to do more than simply reach forward and is, instead, a genuine attempt at posting the letter. Even if this is the case, and to reiterate, in terms of what DF is aware of, it is not at all clear what could be informing the specifics of her performance. What awareness does she have that her chosen method matches the best (or an appropriate) method of G*ing*? She cannot consciously perceive the position of the slot, so there is every reason to suspect that she has no awareness at all of the best (or an appropriate) method to use. Therefore, simply reaching forward (which is what DF initially 'felt' she was doing) even in a genuine attempt to post the letter through the slot seems inadequate to satisfy Hawley's condition (2).[23]

Having said that, DF, and patients with related pathologies, can grow accustomed to their success. Yet even if repeated success provides DF with an air of confidence—and with it an awareness of impending success that she lacked during her initial trials—her actual performance has not altered. If we compared her early trial performances with those of the putatively 'more confident DF', would we want to say that *now* she knows how to post the letter through the slot whereas before she did not?

It may be objected that posting the letter through the slot, although intentional, is not a form of knowing how to; rather, it is simply an ability DF has acquired, and retained even after the onset of her condition. Bennett and Hacker (2003) claim, for example, that walking is not something it is appropriate to say we know how to do. Instead, it is an ability that, in the absence of pathology or environmental restraint, develops over time.[24] An accelerated version of this can be seen in the Wildebeest calf that can stand, walk and run within minutes of being born. We would not want

[23] It might be objected that, in intending to post the letter through the slot, DF does not intend to move her arm at such and such an orientation and trajectory; neither does she know *that* the angle of orientation is *x* and the trajectory *y*. To this, I would say that these specific aspects of the global movement are intentional (rather than mere physical abilities), because they accord with the subject's intention to G, rather than being something that occurs irrespective of it. The further fact that DF is unable to articulate such motor-performance in propositional terms, even though it is an intentional action, further supports my claim for an irreducible form of knowing how to G.

[24] More specifically, Bennett and Hacker claim that walking is an example of a two-way ability because the subject can choose to initiate the action or refrain from doing so.

to say that the calf has acquired the know-how to do this. Bennett and Hacker would no doubt argue that although the development of this ability is slower in humans, it is no less and ability for that.

In response, I am prepared to concede that reaching forward is an ability akin to walking because I do not believe that such a concession affects my argument. I have maintained throughout that DF's action is more than simply reaching forward. What is remarkable about DF's performance, and what surprises her so much, is not that she reaches forward but that she successfully posts the letter. If posting a letter through a slot whose orientation changes from trial to trial is nothing more than the demonstration of a physical ability, then should we say the same of the tightrope walker because he already possesses the ability to walk?

Another objection might incorporate the views of Wallis (2008), in so far as it might be denied that DF initially knew how to carry out the task because she lacked knowledge of how to post the letter through the slot "so described" (p.128). Instead, all she initially knew how to do (so described) was reach forward. Therefore, although DF has always been able to demonstrate an ability to reliably meet the task-specific conditions, she initially lacked any functional connection between her performance and knowledge of how to G under the description of G as *posting the letter through the slot*. After repeated exposure to the test conditions, however, what she acquired was a functional connection between task, knowledge, and ability. With this functional connection in place, she now knows that performing *p* is a reliable means of G*ing* and, in doing so, has acquired knowledge of how to G. In response, however, I would hold that, under such conditions, surely all that DF has actually acquired is the *knowledge that* she knows how to G so described—knowledge that is in addition to her knowing how to G, not the basis for it. To reiterate, as nothing in her *performance* has changed, if it can be said that she now knows how to G, then she must have known how to G before. Acquiring knowledge that what she is doing is reliably posting a letter through a slot does not mean that prior to this she did not know how to G in the manner so described now.[25]

If we accept that DF, in posting the letter through the slot, engages in an intentional action in which she consistently performs *p* rather than other than *p*, where *p* constitutes an appropriate means of G*ing*, then we should accept that DF's action is something more than the demonstration of a mere physical ability to G. This is something we should accept even more when the acquisition of a functional connection between performance *p* and DF's knowledge that what she is doing is succeeding at G (so described) does not alter her performance.[26] Importantly, then, if we accept that performance *p* amounts to knowledge of how to G, then it is of a kind that fails to satisfy the second of Hawley's conditions for knowing how, and in doing so fails to meet the requirements of either knowledge claim (K.C.1) or (K.C.2). It does, however, satisfy (K.C.3*). DF is able to demonstrate an irreducible form of knowledge how precisely because her performance is distinguishable from a mere

[25] Fantl (2008) draws the same conclusion using a different example.

[26] Even if DF never acquires this functional connection, the principle should remain that if she were to acquire such a connection, it would not change her performance.

physical ability (a requirement of thesis 2 of the Standard View) and precisely because it does not satisfy the necessary and sufficient conditions for a reduction to propositional knowledge (a requirement of thesis 1 of the Standard View).[27] In short, it would seem that there exists a form of behaviour that meets the minimum requirements of knowing how to, yet is irreducible to knowing that.[28]

What Pathological Case Studies Teach Us About Knowing How To

Why use pathological case studies? After all, the critic might claim, are there not a whole host of often quite mundane actions that demonstrate precisely this irreducible form of know-how? To illustrate, consider the examples used by Polanyi (1966):

> If I know how to ride a bicycle or how to swim, this does not mean that I can tell how I manage to keep my balance on a bicycle, or keep afloat when swimming. I may not have the slightest idea of how I do this, or even an entirely wrong or grossly imperfect idea of it, and yet go on cycling or swimming merrily. Nor can it be said that I know how to bicycle or swim and yet do *not* know how to coordinate the complex pattern of muscular acts by which I do my cycling or swimming. I both know how to carry out these performances as a whole and also know how to carry out the elementary acts which constitute them, though I cannot tell what these acts are. (p.4)

Such examples of knowing how to, and there are many more, which are typically attributed to humans and non-humans, young and old alike, are made explicit through *performance* and not through language: their medium is behavioural, not linguistic. Importantly, though, just because this form of know-how cannot be expressed through language, or does not employ the concepts that accompany more declarative understanding, it is nevertheless experienced by the subject—human or non-human, child or adult—as appropriate (or so I would argue). Typically, I may not be able to articulate my knowledge of how to cycle or swim, but I know that what I am doing constitutes correct cycling or swimming because I experience it as

[27] A possible response by contemporary intellectualists may be to adopt a weaker position than the one described here. It could be claimed that the reductions involved in (K.C.1) and (K.C.2) suggest that intellectualists are necessarily endorsing some form of psychologism whereby knowledge claims are determined by the subject's *internal* (mental) characteristics and structures. Must it be assumed, therefore, that a subject's 'possession' of knowledge is dependent on his/her ability to articulate or experience 'factually-based propositions'? If, in contrast, the intellectualists were to adopt an *externalist* view, then they could claim that such a move would make them less *susceptible* to the anti-reductionist challenge posed by the case study evidence presented here. Whilst accepting that such a move is open to the intellectualists, it is nevertheless beyond the scope of this paper to discuss its validity further.

[28] It might also be claimed that, as well as knowing how to post the letter through the slot, DF knows *where* the slot is; yet this knowing where is demonstrable only, and cannot be reduced to knowing that. In other words, DF can demonstrate where the slot is, by posting the letter through it, without being able to articulate that it is situated at such and such a location or without experiencing it so situated. This challenges Snowdon's earlier claim that all other forms of knowledge ascription (what, where, whom etc.) are reducible to knowing that. Again I thank Paul Gilbert for drawing this to my attention.

such.[29] As Hutto (2005) points out, even though demonstrations of knowledge-based abilities "do not rest on a kind of propositional rule following… such knowledge is normative in that our performances are still subject to assessment in terms of achievement and failure" (p.390). Conversely, if I were to fall off my bicycle or start to sink under the water, I would know that I am not cycling or swimming appropriately. The same can be said of the small child who knows how to place the ball at the top of a toy contraption in order for it to slide down again, or the sheepdog that knows how to guide the sheep into a pen. Each of these examples satisfies the requirements of (K.C.2). They are not, therefore, examples that can *easily* resist Snowdon's reduction to knowing that. After all, (K.C.2), which is compatible with this reduction, does not require the subject to articulate the particulars of their action in propositional form. It is sufficient for the pre-verbal infant or non-human animal to simply *experience* performance *p* as appropriate and other than *p* as not.[30]

A further objection might be that pathological examples are so extreme and rare that they offer little insight into the question of epistemic reduction. Consequently, they are of little philosophical interest.[31] In response to this, I borrow an example from Dreyfus (1996). Dreyfus discusses the actions of a tennis player 'returning the ball'. When the ball is served, the 'returner' of the serve is unable to articulate or experience the appropriate response at the moment of initiation. The return of serve is initiated pre-consciously. Nevertheless, the returner's action is intentional because it complies with the subject's goal of returning the serve[32] (see Goodale et al. 1986; Paulignan et al. 1990, for research on pre-conscious movement).

This example illustrates a similar inadequacy to Polanyi's cycling and swimming examples—namely, the inability to articulate knowledge of how to G: in this case, return the serve. However, it differs from them in one important respect: the subject does not experience the chosen method of performing *p* at the moment of initiation. The initiation of the return of serve occurs prior to the subject's *awareness* of what is required in order to execute performance *p* and therefore engage in an act of G*ing* (Abernethy 1991). The initiation of performance *p* (return of serve) independently of one's awareness of the particulars of G can be likened to DF's movement in the postal slot task. Both comply with the subject's respective intention to G and both involve a form of knowing how to that is neither articulable nor experiential (at least at the point of initiation).

What the pathology example is able to offer in addition, however, is the isolation through dysfunction of the key neurological pathways said to subserve visuomotor action—the ventral and dorsal projections from area V1 of the visual cortex (Milner and Goodale 1995). The ventral stream underlies the process that enables the

[29] By this, I mean that I experience it as such within the framework of what I have learned constitutes correct cycling or swimming. The level of correctness may vary depending on context, but it is a measure I can be instructed to aim for and therefore experience as correct when achieved.

[30] For a detailed discussion on the sort of non-conceptual thinking alluded to by (K.C.2), see Bermúdez (2003).

[31] I thank Jack Marr for bringing this objection to my attention.

[32] One might want to say that returning the serve is a specific (subordinate) goal within the subject's overall intention of playing tennis.

conscious identification of objects. It is damaged in DF, hence her visual agnosia.[33] Her dorsal stream, on the other hand, which projects to the posterior parietal lobe, still functions, enabling her to engage in certain visuomotor acts similar to the one described. DF and related cases[34] are able to demonstrate the functioning of one pathway in isolation from the other, something that is not possible in non-pathological cases, making these pathways' independent (but interrelated) function less apparent.

If, as I have argued, DF is able to demonstrate a minimal level of knowing how to G, because of her functioning dorsal stream, then this same minimal level knowledge must be a part of non-pathological performance also (because these subjects have functioning dorsal streams). However, in the case of non-pathological subjects, this minimal knowledge is masked by the addition of a fully functional ventral stream which in conjunction with dorsal stream processing enables the subject (potentially) to engage in performances of *p* that are articulable and/or experiential, thus satisfying at least one of the knowledge claims (K.C.1) and (K.C.2). Pathological cases like DF allow us to record the performance of the dorsal stream in (relative) isolation, something that is only measurable in highly controlled environments—as is the case with Abernethy's research on the tennis player's return of serve—and is greatly obscured in everyday examples of cycling and swimming. Because they demonstrate independent neural functioning, cases like DF, allow us to speculate over the extent to which a minimal form of knowing how to—a form that is irreducible to knowing that—underscores intentional action. Thus, in cases of swimming or cycling or suchlike, those who would resist the move to reduce *completely* such performances to knowing that ascriptions, and instead hold that such know-how constitutes a skill (rather than a mere physical ability) independent of facts pertaining to performance, should welcome the findings from pathological case studies like DF and, hopefully, concur with my evidence and argument for a limit on epistemic reduction.

As a variation on this second objection, it might be argued that if pathological examples are to be used, then a more profitable avenue of exploration would be declarative and procedural memory. Amnesic patients, for example, often retain knowledge of how to G (procedural memory) without being able to declare facts pertaining to the acquisition of this knowledge or without knowing that they possessed this know how at all (Gabrieli 1998). As with the case of animals and pre-verbal infants, I accept that such evidence stands against (K.C.1). However, like animals and pre-verbal infants, amnesic patients are typically able to experience knowing how to G as something they do appropriately. An amnesic, who does not know that he can play the piano, quickly acquires such knowledge upon playing the instrument (even if later this knowledge is forgotten again). His experience informs his knowledge acquisition and, moreover, guides his performance. In such a situation, (K.C.2) is satisfied.

[33] fMRI scans of DF have confirmed the ventral stream damage (see Culhan and Kanwisher 2001; James et al. 2003).

[34] Cases of optic ataxia demonstrate the role of the retained ventral stream in the absence of a fully functioning dorsal stream (see Milner et al. 2001).

Finally, earlier, when describing the postal slot task by Goodale et al. (1991), it was noted that DF was unable to mirror the orientation of the slot with just her hand (except on fortuitous occasions). Despite failing in this task, what is apparent is that DF possesses the physical ability to manoeuvre her hand in a way that indicates possible slot orientation—she simply fails to match her position to that of the slot. It could be argued, therefore, that DF still knows how to *manoeuvre her hand* so as to indicate the slot's position (as one would assume she knew how to do prior to her injury), it is simply that, now, unlike before, owing to her injury, she is unable to succeed (reliably) in matching hand position with slot orientation. The reason for her lack of success, then, stems not from a lack of know-how but from a deficit in her visual processing.[35] Presumably, if the damage were repaired, a successful and reliable demonstration of mirroring would follow.

In response, I would say first of all that my interest is in what DF can still do, not in what she cannot; and that it has been my contention that her (retained) ability to post the letter through the slot demonstrates a form of knowing how to G that satisfies neither (K.C.1) nor (K.C.2) and therefore any claim to know *that* G is the case. However, I recognise that some discussion on her failure at the mirroring task might prove useful.

If DF, post injury, still possesses knowledge of how to place a letter through a slot, *and* of how to manoeuvre her hand to mirror slot orientation, then why does she succeed at the former and not the latter? In the mirroring task, owing to ventral stream dysfunction, DF lacks information pertaining to the slot's orientation—information normally carried within a representational state of the object. Because of this, she cannot *know that* it is positioned at such and such an angle. This is analogous to the escapologist not knowing how to escape from the box because he does not know that he needs to press the secret catches simultaneously and then one after the other from left to right, even though he possesses the ability (knows how) to press secret catches simultaneously and/or sequentially. I am therefore prepared to accept that DF knows how to manoeuvre her hand in a manner required by the mirroring task. However, the reason why she is unable to succeed at this task is because, in addition, she does not know that the slot is positioned at such and such an angle, and therefore that she has to manoeuvre her hand (which she knows how to do) accordingly.

If DF were to succeed (reliably) at the mirroring task then it should be accepted that she knows how to mirror the slot's orientation. But as noted throughout this paper, 'knows how to' is ambiguous. Do we mean that she knows *that* such and such is required (knowledge that is reducible to knowing that) or, rather, that she is able to demonstrate independently of this some other ability-related knowledge that is not reducible in this way (mirroring rather than just manoeuvring)? When succeeding in the mirroring task, the existence of the latter cannot be established because of the ambiguity surrounding the use of 'knowing how to' in this context. Instead, it is evidenced, or so I have argued, by DF's retained performance success at the postal slot task.

In the postal slot task, DF is reliably successful. Neurologically speaking, her success stems (in part) from information processed along her undamaged dorsal

[35] I thank the anonymous referee for raising this objection.

stream. This information is provided only on those occasions when the subject (DF in this case) interacts directly with the object (during the posting of a letter, for example, and not, importantly, when mirroring). It is my contention, therefore, that this information informs DF's performance during the initiation of an intentional action to the point where it forms part of her knowledge of how to G. However, and to reiterate yet again, this knowledge cannot be reduced to knowledge *that* such and such is the case. Information processed along the ventral and dorsal streams not only relates to different aspects of objects (crudely put, this amounts to allocentric spatial dimensions in the case of the ventral stream, and egocentric dimension for the dorsal stream, although this is not exhaustive), but forms the basis for different forms of knowledge.

Conclusion

In conclusion: to argue for a minimal form of knowing how to is not, importantly, to deny the relevance of Snowdon's (and other likeminded individuals') challenge. Certainly a form of the knowledge ascription 'knowing how to G' is equivalent to knowing that, and I believe that Snowdon illustrates this well. However, it has been the aim of this paper to show how the actions of DF, to intentionally engage with her environment despite her pathological condition, support the argument for the existence of an irreducible form of procedural knowledge. This in turn, has allowed me to amend the Standard View in a way that, I believe, is resistant to those who wish to reduce all forms of knowledge how to knowledge that.

Earlier, I amended thesis (2). To finish, consider an amended version of thesis (1).

> (1*) There exists *a form* of knowing how that does not consist in knowing that some proposition is true or that some fact obtains; this form of knowing how cannot be reduced to or equated with (any form of) knowledge that.

I appreciate that the descriptive term "A form of knowing how" is somewhat clumsy, and await a 'stappier' label. That issue aside, by arguing for thesis (1*), I am not denying that some (perhaps even most) forms of knowing how can be reduced to knowing that or, as Hornsby and Stanley claim, that such knowing how amounts to knowing procedural facts; and therefore that, for these forms of knowledge, thesis (1*) does not apply. I deny only that *all* forms of knowledge-based action are reducible to knowing that.

In addition, I accept that challenges to Snowdon's brand of epistemic reduction may exist in forms other than the one presented here. Everyday examples like riding a bicycle or swimming, or of the actions of pre-verbal infants and non-human animals, are often used to illustrate the distinction between knowing how and knowing that. However, because of their experiential content, such actions include a form of knowing how that satisfies the demands of (K.C.2) and are thus vulnerable to Snowdon's reductionism. What is less apparent in these examples is the existence of a minimal form of knowing how that underscores the individual's performance, and is subserved (in visuomotor action, at least) by the dorsal stream's projection to the posterior parietal lobe. A form of knowing how that is demonstrated in isolation by DF and similar pathological cases, and forms the basis for skills above and

beyond mere physical ability. For this reason, then, the use of case study examples is invaluable as a means of demonstrating the existence of an irreducible form of procedural knowledge.

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