On Amnesia and Knowing-How

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Abstract
In this paper, I argue that Stanley and Williamson's 2001 account of knowledge-how as a species of knowledge-that is wrong. They argue that a claim such as "Hannah knows how to ride a bicycle" is true if and only if Hannah has some relevant knowledge-that. I challenge their claim by considering the case of a famous amnesic patient named Henry M. who is capable of acquiring and retaining new knowledge-how but who is incapable of acquiring and retaining new knowledge-that. In the first two sections of the paper, I introduce the topic of knowledge-how and give a brief overview of Stanley and Williamson's position. In the third and fourth sections, I discuss the case of Henry M. and explain why it is plausible to describe him as someone who can retain new knowledge-how but not new knowledge-that. In the final sections of the paper, I argue that Henry M.'s case does indeed provide a counterexample to Stanley and Williamson's analysis of knowing-how as a species of knowing-that, and I consider and respond to possible objections to my argument.

I. Introduction

Philosophers sometimes distinguish between two kinds of knowledge: knowledge-that and knowledge-how. Knowledge-that is sometimes referred to as propositional knowledge, declarative knowledge or factual knowledge. Paradigmatic instances of knowledge-that include: (a) knowing that Albany is the capital of New York; (b) knowing that 2 + 2 = 4; and (c) knowing that the Romans had an elaborate system of aqueducts. Knowledge-how, on the other hand, is generally associated with abilities or skills. Knowledge-how is sometimes referred to as applied knowledge, practical knowledge, procedural knowledge or simply know-how. Typical examples of knowing-how include: (d) knowing how to ride a bicycle; (e) knowing how to speak a language; and (f) knowing how to fix the plumbing.

Philosophers have devoted most of their epistemological attention to studying and analyzing knowledge-that (hereafter KT), and significantly less time and effort in consideration of knowledge-how (hereafter KH). The attention that has been paid to KH can, for the most part, be traced back to Gilbert Ryle's 1949 book *The Concept of Mind*.[1] There (and in other writings[2]) Ryle defends the view that KT and KH are, in fact, distinct kinds of knowledge. He perceives this view as being in opposition to philosophical orthodoxy, which held (or so claimed Ryle) that KH is reducible to (or is a kind of, or species of[3]) KT. Ryle gave a number of arguments criticizing this orthodoxy, most notably the argument that this position leads to problems involving infinite regresses.

More recently, the subject has received a flurry of attention stemming from a 2001 article by Jason Stanley and Timothy Williamson in the *Journal of Philosophy* entitled "Knowing How".[4] In that paper, Stanley and Williamson argue against the claim that "there is a fundamental distinction between knowledge-how and knowledge-that." On their view, Ryle, "was wrong to deny that 'knowledge-how cannot be defined in terms of knowledge that' (1971, p. 215)." Stanley and Williamson conclude that, "(k)nowledge-how is simply a species of knowledge-that."[5]

This conclusion rests on claims (which I will briefly describe below) about the syntactic structure and semantic properties of KH and KT ascriptions. Unsurprisingly, critics of Stanley and Williamson have challenged the linguistic claims upon which their argument depends.[6] However, I would suggest that a more straightforward way to raise doubts about Stanley and Williamson's conclusion is to present a counterexample(s). That is, if there are cases in which it can be shown that an agent possesses KH but does not possess the relevant KT, it would seem that Stanley and Williamson's account would be shown to be false. Such cases do, in fact, exist.

In what follows, I will describe one such case. First, though, in Section II, I will summarize Stanley and Williamson's argument for the conclusion that KH is a species of KT, and summarize their account of KH. Then, in Section III, I present the history of a man called Henry M. who, after brain surgery, lost the ability to retain new propositional knowledge. In Section IV, I provide evidence that Henry nevertheless possesses the ability to acquire and retain new KH. In Section V, I revisit Stanley and Williamson's account of KH as a species of KT and argue that Henry M. is indeed a counterexample. Finally, in Section VI, I consider and respond to some potential objections to my argument.

II. Stanley and Williamson on Knowing-How and Knowing-That

As noted above, Stanley and Williamson argue that knowing-how (KH) is a species of knowing-that (KT). They make their case by first undermining Ryle's claim that views such as theirs, which deny the claim that KH and KT are distinct, necessarily have regress problems. They note, however, that not all critiques of views such as theirs rely on regress-type objections. Others who, like Ryle, have defended the view that KH and KT are distinct have done so by arguing that examination of KH ascriptions and KT ascriptions reveals fundamental differences between the two kinds of knowledge.[7] For example, consider the following sentences:

(i) John knows how to ride a bicycle.
(ii) John knows that Albany is the capital of New York.

The two sentences have a surface similarity, with "John" as the subject and "knows" as the verb. However, as William Bechtel and Adele Abrahamsen point out, "…the expression 'knowing that' requires completion by a proposition, whereas the expression 'knowing how' is completed by an infinitive (e.g. 'to ride') specifying an activity."[8] According to this argument, this linguistic difference is meant to indicate a substantive difference between the two kinds of knowledge.

Stanley and Williamson, on the other hand, argue that this linguistic difference is superficial, and that a deeper look at the structure of such knowledge ascriptions reveals (according to "recent syntactic theory") that, "to say that someone knows how to F is always to ascribe to them knowledge-that."[9] More specifically, according to Stanley and Williamson, a claim such as "Hannah knows how to ride a bicycle":

> …is true relative to a context *c* if and only if, there is some contextually relevant way *w* such that Hannah stands in the knowledge-that relation to the Russellian proposition that *w* is a way for Hannah to ride a bicycle, and Hannah entertains this proposition under a practical mode of presentation.[10]

Simplifying things a bit, we can summarize Stanley and Williamson's account of KH ascriptions

as follows:

> The sentence "Hannah *knows how* to ride a bicycle" is true if and only if Hannah *knows that* such-and-such is a way for her to ride a bicycle, and she knows this under a practical mode of presentation.

This last clause about knowing the proposition "under a practical mode of presentation" is meant to distinguish cases such as the following:

(a) Sue has read lots of books about riding a bicycle and has studied the methods involved in riding a bicycle, but she has never actually ridden a bicycle.
(b) John has much experience riding a bicycle and has been doing so for years.

In both cases, we could say that the subject knows that such-and-such is a way to ride a bicycle, but only in case (b) would we characterize this as knowledge under a practical mode of presentation (and thus, only in case (b) would we properly characterize the subject as knowing how to ride a bicycle).[11]

So, Stanley and Williamson argue from the linguistic structure of the various kinds of knowledge ascriptions to the conclusion that KH is a species of KT. And according to Stanley and Williamson's analysis, a claim ascribing KH to some agent is true if and only if that agent has propositional knowledge of a certain sort. Thus, if some agent acquires and possesses some bit of KH she can thereby be said to have acquired a bit of KT. In what follows, I attempt to challenge their analysis by describing a man who is capable of acquiring bits of KH but who cannot acquire the relevant bits of KT.

III. The Strange Case of Henry M.

In 1953, a 27-year-old man referred to as Henry M.[12] underwent a "fractional lobotomy",[13] a procedure intended to reduce the severity and frequency of his epileptic seizures. The surgery consisted of removing parts of Henry's medial temporal lobes[14] – including his hippocampus – a procedure that was experimental, but had been successful in reducing seizures in other patients. With respect to the seizures, the surgery was a (relative) success.[15] However, the surgery also had a "striking and totally unexpected behavioural result: a grave loss of recent memory…"[16] That is, while Henry could remember much of his life (and the things he knew) before entering the hospital for surgery, he was unable to remember recent, post-surgery events, or people that he had recently met (such as the hospital staff).

Henry's amnesia is not the typical form of that condition – the kind that (along with long-lost twins and alien abductions) often comes to the rescue of struggling soap opera writers. In that familiar version of amnesia, one is unable to recall events from before the trauma, though is in most other ways normal. That kind of amnesia is called *retrograde amnesia*, which means (to put it a bit crudely) that old memories are gone, but new ones can be formed.

By contrast, Henry has a form of amnesia that is quite different in that he retains memories from before the traumatic event but cannot form new memories of things that have happened since the surgery. Or at least, he cannot *retain* new memories for more than a few minutes at a time (that is, he cannot shift short-term memories into his long-term memory). This form of amnesia is called *anterograde amnesia*, which involves (again, crudely put) the ability to retain old memories but the inability to retain new ones.[17]

When it became apparent that Henry's amnesia was not a short-term result of the surgery, Dr. William Scoville (Henry's surgeon), and his colleagues began to perform tests in an attempt to determine the severity of Henry's condition. He and his colleagues wanted to know:

> …whether [Henry] was severely impaired regardless of the kind of memory test (free recall, cued recall, yes/no recognition, multiple-choice recognition, learning to criterion); regardless of the kind of stimulus material (words, digits, paragraphs, pseudowords, faces, shapes, clicks, tones, tunes, sounds, mazes, public events, personal events); and regardless of the sensory modality through which information was presented (vision, audition, somatosensory system, olfaction).
>
> The answer to these questions, on the basis of decades of experiments, is 'yes': his impairment is not only severe, but also pervasive.[18]

Henry retained his capacity for short-term memory – i.e. he could remember new information for short periods of time (seconds or minutes) given a suitable environment and a certain level of attentiveness. He also retained much knowledge acquired before the surgery – knowledge of his parents' names, for example, as well as knowledge of word meanings, knowledge of how to speak and write English, and knowledge of how to walk and control his body. Additionally, Henry has retained general reasoning abilities (his scores on general intelligence tests are comparable to others of the same age and background and have been consistent both before and after the surgery[19]), language abilities, and social abilities.

What Henry lost was the ability to retain new memories, or at least new memories of a certain kind. Specifically, the damage done to Henry impaired his ability to retain "declarative memories". Declarative memories come in two main forms: episodic memories and semantic memories. Episodic memories, as the name suggests, are memories of particular episodes – i.e. events associated with a particular time and place – for example, remembering that one had eggs for breakfast yesterday; or remembering the night of one's senior prom; or remembering the moment one's child was born; or remembering the day that President Kennedy was assassinated. Semantic memory involves the ability to retain and recall general facts about the world (including, as the name suggests, the meanings of words). So, remembering that "software" refers to computer programs would be an example of a semantic memory, as would remembering that Paris is the capital of France, and that fire requires fuel, heat and oxygen.[20]

Further study of Henry has been done over the years since his surgery (quite a lot of it, actually[21]), and it has continued to reveal that "even with thousands of repetitions, he is unable to learn new facts. His doctors must reintroduce themselves each morning, and [Henry] is never sure where he is for very long".[22] Suzanne Corkin, a neuroscientist who has studied Henry extensively for decades, finds his condition basically unchanged. In a 2002 article, she wrote that Henry's condition "manifests as deficient acquisition of episodic knowledge (memory for events that have a specific spatial and temporal context) and of semantic knowledge (general knowledge about the world, including new word meanings)."[23]

It seems fair to describe Henry as being unable to acquire and retain new propositional knowledge, or KT. The sorts of things that he cannot remember and learn (or learn and retain for very long) are propositional in nature. He cannot remember that his doctors' names are such-and-

such, or that he is now older than 27, or that such-and-such person is President, etc. These are paradigm cases of KT.[24]

IV. Henry and Procedural Knowledge

A number of years after Henry's surgery, as doctors and scientists continued to study the range of his memory loss, researchers discovered a "kind of memory task that [Henry] can perform normally: skill learning."[25] That is, Henry can acquire what neuroscientists call "procedural knowledge". As Corkin reports:

> The dissociation in H.M. between the acquisition of declarative memory and other kinds of learning was initially shown for motor learning. The first experimental demonstration of preserved learning in amnesia was [neurologist Brenda] Milner's report that H.M.'s time and error scores decreased within and across three days of training on a mirror-tracing task. H.M. was asked to draw a line between two adjacent outlines of a star-shaped pattern, but he could see only his hand, the pencil and the star reflected in a mirror (with left and right hand reversed). Although no control data were reported, he showed clear skill learning, in marked contrast to the absence of declarative memory for any details of the testing sessions, or even a feeling of familiarity. Subsequent studies…showed that his initial performance on motor learning tasks was inferior to those of control participants, but that he could still show consistent improvement over several consecutive days of testing, and that he could retain that non-declarative knowledge for as long as a year. These results indicate that acquisition and retention of a visuomotor skill rely on substrates beyond the MTL [medial temporal lobe] region.[26]

To be clear, with regard to the mirror-drawing task, Henry did not remember having learned the task, or having done the task before (when asked, he would report each time that he had never tried it before – or that he did not remember doing so). And yet with each new practice session, his performance continued to improve (though not generally as quickly as non-amnesic patients). He acquired the skill despite having no memory of having done so. Henry knew how to do the mirror-drawing task (and he got consistently better at it with practice), but did not know that he knew how, or that such-and-such was a way of doing the task.

The mirror-drawing experiments were performed on Henry in 1959, which was six years after his surgery. Later, in 1962, further tests of skill-learning were performed and it was discovered that "while unable to learn the correct sequence of turns in a 10-choice tactual maze, Henry gradually reduced his time scores over 80 trials." Corkin noted that "on the basis of these two findings, it was hypothesized that other motor skills could also be acquired by patients with bilateral lesions of the medial temporal structures." [27] Corkin set out to explore this hypothesis and constructed further tests of Henry's abilities with respect to motor-learning tasks, many of which required placing a stylus on a moving target. She found that, although Henry's scores on such procedures were lower than those of the control group:

> On the two tasks which involved learning over several days (Rotary Pursuit and Bimanual Tracking), H.M.'s performance improved from session to session and from day to day. Similarly, his tapping scores after a 40-min rest interval were superior to those recorded before it.

Corkin concluded that these results provided "additional support to the notion that the medial temporal-lobe structures are not necessary for the acquisition of motor skill." [28]

Henry has, over the years, demonstrated similar abilities with respect to other skill-learning tasks – for example, the Tower of Hanoi puzzle, which involves shifting ordered stacks of donut rings from one pole to another according to certain rules.[29] Additionally, Henry's results have been repeated with other amnesics similar to Henry as well as in animal experiments involving creatures with hippocampal-system damage similar to Henry's. Additionally, brain scientists Neal J. Cohen and Howard Eichenbaum, who have pioneered much of this research, note that neuropsychologists have found a double dissociation between skill learning and [propositional] recall and recognition which provides "strong evidence for claiming a distinction between the cognitive processes or systems mediating the dissociated categories of performance."[30]

Based on this sort of evidence, it seems fair to describe Henry as having the ability to acquire and retain knowledge-how, or KH. The sorts of things that he can acquire (and retain over time) are memories of how to perform new skills and abilities. He can remember how to do puzzles, perform tasks and follow procedures. These are paradigm cases of KH.

V. Stanley and Williamson's Account Revisited

The evidence cited above supports the claim that Henry can acquire and retain KH but is incapable of acquiring and retaining KT. Now, recall that according to Stanley and Williamson, a claim such as "Hannah knows how to ride a bicycle" amounts to:

> The sentence "Hannah *knows how* to ride a bicycle" is true if and only if Hannah *knows that* such-and-such is a way for her to ride a bicycle, and she knows this under a practical mode of presentation (this is my simplified version of their account from page 4 above).

Applying this analysis to Henry, we would get something like:

> The sentence "Henry knows how to perform the Rotary Pursuit Task" is true if and only if Henry knows that such-and-such is a way for him to perform the Rotary Pursuit Task, and he knows this under a practical mode of presentation.

However, given what we know about Henry, we can now see that this analysis cannot be correct. For Henry *does* know how to perform the Rotary Pursuit Task but he *does not* know that such-and-such is a way for him to perform the Rotary Pursuit Task.[31] Thus the left side of the above biconditional is true (since Henry knows how to do the task) while the right side is false (since Henry does not know that such-and-such is a way to do the task). Therefore, the biconditional is false and the analysis fails. This conclusion does not depend on an analysis of Stanley and Williamson's inchoate notion of a "way" or a "practical mode of presentation". Rather it follows directly from facts about Henry's condition along with standard interpretations and paradigmatic examples of the concepts involved.

VI. Objections and Responses

There are, of course, a number of ways to challenge the argument that I have given above. The most likely objections, I suspect, will involve arguing that either (1) Henry does, in fact, have KT, or (2) Henry lacks KH. In what follows I consider and respond to both sorts of objections.

I expect that those sympathetic to Stanley and Williamson's view will simply insist on the claim that Henry does, in fact, have some propositional knowledge with respect to the Rotary Pursuit Task (or whatever the example of KH might be). But on what basis could such a claim be made? Henry retains no memory of performing the task from one instance to the next and if later he is asked questions about the task or about how to do it, he will not be able to answer them. If asked whether he has ever performed the task before, he will respond negatively. So again, given our ordinary conception of propositional knowledge, it seems odd to say that Henry knows that such-and-such is a way for him to perform the Rotary Pursuit Task.

Now it might also be true that a normal person who knows how to perform the task might lack the ability to describe how it is done (due to poor descriptive abilities, for example). This would not preclude us from claiming that she nevertheless had propositional knowledge with respect to the task. But Henry is importantly different from such a person. Henry does not merely lack the ability *to describe* how the task is performed; he lacks any memory of having performed it. More fundamentally, he lacks the ability to retain such memories for any length of time. Thus, when faced with the task on a new day, Henry will not assent to claims such as "you have successfully performed this task before" or "such-and-such is a way (for you) to perform the task". It seems fair to say that Henry retains *no beliefs whatsoever* about how the task is performed from one time to the next, and so cannot thereby be said to have propositional knowledge about it.[32]

It might be argued that Henry does have beliefs about the task, but that they are tacit, or implicit, or in some other way outside the purview of his consciousness. Just as, for example, many people hold the tacit belief that the number of people in the room at a given time is less than a million, even though they might not explicitly entertain such a belief, perhaps Henry holds beliefs about the Rotary Pursuit Task that are not explicit. In other words, perhaps Henry's problem is one of access – that is, he *has* beliefs about the Rotary Pursuit Task, but he cannot get at them, or call them to consciousness.

However, this seems unlikely, based both on the empirical data and on our traditional conception of tacit/implicit beliefs. With respect to the empirical data, the most mature neuroscientific theories posit that the hippocampus is necessary for retaining propositional attitudes – not just for accessing them.[33]

With respect to the traditional conception of tacit/implicit beliefs, on most accounts of such beliefs if the belief is made explicit, the person who holds the belief (upon sufficient consideration) will assent to it. Henry, however, will not assent to such claims. He will, in fact, deny at least some of them (e.g. he will deny that he has ever encountered this task before). Additionally, some other characteristics that are sometimes assigned to tacit beliefs – e.g. that they are inferentially connected to other beliefs (desires, etc.) – do not seem to apply to Henry either. Nothing Henry does or says (other than doing the task itself) implies that he has beliefs about the way to perform the task. It might be asserted that from the fact that Henry can perform the task that he *must* thereby have beliefs about it. But this assertion begs the question at hand. Are there reasons for assigning beliefs to Henry that are not question-begging? Well, there are a number of different philosophical views about what beliefs are, exactly, but it is difficult to see how Henry could be said to have the relevant beliefs on any of these views. It is simply implausible to call something a 'belief' when it is completely inaccessible, beyond conscious recognition and unconnected to other propositional attitudes that Henry has.[34]

It might be argued (by those sympathetic to Stanley and Williamson's position) that Henry has propositional knowledge based on linguistic evidence. The argument might go as follows: (a) we can ascribe KH to Henry regarding, for example, the Rotary Pursuit Task; (b) linguistic analysis tells us that to ascribe KH to Henry with respect to the Rotary Pursuit Task is to ascribe KT to Henry with respect to the Rotary Pursuit Task (under a practical mode of presentation); (c) therefore, Henry *has* propositional knowledge and is thus not a counterexample to Stanley and Williamson's analysis.

In response, I would argue as follows. While I would certainly agree with premise (a), and for the sake of argument, will grant Stanley and Williamson premise (b), it does not seem that the conclusion necessarily follows. That is because the premises are about our ordinary concepts and our use of language (which are the domain of linguistic analysis) while the conclusion is about actual states of Henry's brain (which is, to some degree, the domain of neuroscientists doing empirical research). The case of Henry is (in part) meant to demonstrate that caution should be used in making this type of inference – from premises about the linguistic properties of knowledge ascriptions to a conclusion about what possessing knowledge actually consists in. Or put another way, if Stanley and Williamson are correct, what are we to say about the work done by the scientists who have been studying Henry (and others like him) for the past half-century? Such scientists have generated and confirmed numerous hypotheses and theories about the neurological substrates of various mental phenomena, including knowledge, beliefs and memories. I would argue that their work has led to significant progress concerning our understanding of the nature of knowledge, and that it should not necessarily be dismissed if it clashes with the linguistic analysis of knowledge-ascriptions.

Stanley and Williamson might reply that what such scientists have indeed made significant progress, but that what they were *really* investigating was not whether Henry possessed KH or KT (or both, or neither), but rather whether Henry had propositional knowledge *under a practical mode of presentation*. Even aside from problems with Stanley and Williamson's notion of practical modes of presentation,[35] this response is unsatisfactory. That is because as noted above, current scientific theories based on recent neurological findings shed doubt on the possibility that Henry is capable of retaining propositional attitudes in general. We need not agree with such theories to see that they, and the evidence they are based on, are relevant to the debate about KH and KT. Stanley and Williamson's analysis, however, calls into question the relevance of such data.

In his article "Against Intellectualism", Alva Noë makes a similar point in response to Stanley and Williamson. Noë asks:

> Why should linguistic analysis be regarded as dispositive in matters like this? Is it not a home truth of analytic philosophy that grammar can mislead? What does the grammar have to do with what we are talking about or thinking about or studying when we study practical knowledge?[36]

And:

> …Stanley and Williamson's investigation is in some ways methodologically backward. It is a mark of philosophical progress that we can now see that neither linguistic analysis nor cultivated intuitions are the key to understanding the nature of the mind.[37]

So while linguistic evidence is certainly of interest, and relevant to questions related to KH and KT, it is not the only sort of evidence that should to be taken into account. The kind of evidence

that has come to light through the study of Henry M. (and others like him) – empirical evidence that has arisen via the scientific study of the brain – is certainly something that philosophers with an interest in this topic need to consider.

I do not, then, believe that there are good arguments for the claim that Henry does, in fact, possess KT regarding the various skills and abilities that he possesses. What, though, of the other form of objection to my conclusion – i.e. the claim that Henry does not actually possess KH? There are at least two reasons that someone might make such a claim. First, it might be argued that all knowledge has a propositional component and therefore, if Henry's "knowledge-how" lacks such a component, it is not truly knowledge. Put another way, it might be said that Henry does not, in fact, have KH because he does not possess knowledge at all. So, one might claim that since Henry lacks any explicit propositional knowledge of the Rotary Pursuit Task, or conscious ability to formulate strategies for performing the task, or memories about how he performed the task, then it cannot be claimed that Henry has knowledge of the puzzle. Rather, he only possesses an ability or skill which, by itself, is not knowledge. In short, such a claim challenges the view that KH – if it merely consists of the performance of abilities or skills and lacks any propositional characteristics – should be considered a kind of knowledge at all. This objection amounts to an embrace of what Ryle called "the intellectualist legend" and what Noë refers to as "intellectualism".

However, such a challenge begs important questions. Those who claim that Henry has knowledge of some sort would presumably not deny any of the above claims (that he lacks explicit propositional knowledge, etc.) and yet could still insist that he *knows* how to perform this task. They might make this claim based, most importantly, on the fact that Henry *can* in fact perform this task and that his performance on the task improves with time and practice. That implies that his success is not merely accidental or lucky. Additionally, Henry's brain and body are involved in this activity, and they change and adapt in response to repeated exposures to it. Henry is not simply demonstrating instinctual behavior or autonomic responses to stimuli. He *learns* how to perform the task, and in doing so, learns something about how to navigate the world (or, at least, a small part of it). It is difficult to see why this should not be described as acquiring knowledge – unless one begins with the assumption that all knowledge is propositional in nature.[38]

Finally, one might accept that there is such a thing as KH and that it has a non-propositional nature and yet still argue that Henry does not possess KH. One might argue for this conclusion by claiming that Henry's behavior simply does not meet the standards required to qualify as KH. This objection assumes that such standards have been established, which is debatable. Nevertheless, there have been a few proposals put forward about the criteria one must meet to possess KH and according to all of these proposals (the ones that I am aware of) Henry does, in fact, qualify as acquiring KH. For example, Henry has the ability to perform the task and it can be said of Henry that he is disposed to perform the task under the appropriate circumstances. Similarly, Henry succeeds at performing the task, his success is non-accidental, and if he tries to perform the task under the appropriate circumstances, he succeeds.[39]

VII. Conclusion

Henry M. (and others like him) provide a compelling reason to reject Stanley and Williamson's account of KH as a kind of KT. On Stanley and Williamson's account, possession of KH implies possession of a corresponding bit of KT. Henry M's condition shows, however, that possession

of KH is possible in the absence of the ability to acquire (and/or retain) KT. So Stanley and Williamson's account appears to be wrong.

Perhaps more importantly the case of Henry M. (and all the work, research and theorizing that has sprung from it), has potentially profound implications for epistemological questions about the relation between theoretical scientific knowledge and technological knowledge. In-depth consideration of such implications is beyond the scope of this essay. However, it should be noted that if it is indeed the case that KH and KT are distinct kinds of knowledge, with distinct neural substrates, then it might also be the case that epistemological theories and ideas that have been developed using theoretical scientific knowledge as a model could be counterproductive as tools for analyzing technological knowledge.[40]

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Endnotes

[1] Ryle, Gilbert 1949. See especially Chapter 2.

[2] Especially Ryle 1946.

[3] These positions are not all the same, though Ryle tends to bunch them together. Stanley and Williamson's position (discussed below) is that KH is a species of KT but that it is not reducible to KT. I will focus on their particular position throughout the paper unless otherwise noted.

[4] Stanley and Williamson 2001.

[5] Stanley and Williamson 2001, pg. 411. Citations are from the *Journal of Philosophy* version of the paper (see fn 4 above). There is also a version of the paper online at: http://www.rci.rutgers.edu/%7Ejasoncs/JPHIL.pdf. The Ryle reference in the quote cited is to Ryle's "Knowing How and Knowing That" (see fn 2 above).

[6] Including: Koethe 2002, Schiffer 2002, Rumfitt 2003, and Noë 2005.

[7] For example, David Carr in his articles "The Logic of Knowing How and Ability", *Mind*, 88 (1979): 394-409, and "Knowledge in Practice", *American Philosophical Quarterly*, 18 (1981): 53-61. Also Bechtel, W. and Abrahamsen, A. 1991. *Connectionism and the Mind: An Introduction to Parallel Processing in Networks*, Oxford: Basil Blackwell.

[8] Bechtel and Abrahamsen 1991, pg. 151.

[9] Stanley and Williamson 2001, pg. 426. The reference to recent syntactic theory is on pg. 417.

[10] Stanley and Williamson 2001, pg. 430.

[11] Stanley and Williamson argue for the existence of practical modes of presentation by invoking the analogy of first-person modes of presentation. For criticism of this aspect of Stanley and Williamson's analysis, see Noë 2005, pp. 287-88.

[12] Henry M. is sometimes referred to as "H.M." or "Mr. M.". I collected general information on Henry M., his condition, his surgery, etc. from a number of different sources ranging from his surgeon, Dr. William Scoville's, 1957 article (co-authored by Brenda Milner), in which he first published information on Henry M., entitled "Loss of Recent Memory After Bilateral Hippocampal Lesions" in the *Journal of Neurology, Neurosurgery and Psychiatry* (JNNP), vol. 20, pp. 11-21; to a biographical book about Henry by Philip J. Hilts called *Memory's Ghost: The Nature of Memory and the Strange Tale of Mr. M.* Touchstone. 1996. Additionally, Suzanne Corkin, a cognitive scientist at MIT, has worked with, and written about, Henry extensively and a number of her articles are cited below.

[13] Scoville and Milner's terminology

[14] The brain has two medial temporal lobes, one in each hemisphere. If you put your hands on each of your temples, the medial temporal lobes would be underneath them. The temporal lobes are today associated with (among other things) memory and language skills, though their function was more mysterious when Henry underwent his surgical procedure.

[15] Henry went from having severe seizures almost daily before the surgery to having two or fewer a year after the surgery. See Corkin 2002.

[16] Scoville and Milner 1957, pp. 13-14.

[17] The main character in the 2000 film *Memento* suffered from this form of amnesia.

[18] Corkin 2002, pg. 153.

[19] Corkin 2002, pg. 153-4. See also, Hilts 1996, pg. 116.

[20] There are some exceptions to the above claims (see Corkin 2002 for some discussion). Henry can acquire bits and pieces of new semantic knowledge – for example he can sometimes identify names of people that have become well-known since his surgery if given parts of the name or descriptions. Such exceptions are sometimes attributed to minor remnants of Henry's hippocampus that survived the surgery, or to other parts of the brain (retained by Henry) that might be partially responsible for certain kinds of memories. The exceptions are rare, however, and for the most part Henry has been unable to new episodic or semantic memories since his surgery.

[21] Corkin, a cognitive scientist at MIT, estimates that over 100 investigators have poked and prodded H.M. since his condition arose in 1953. See Corkin 2002, pg. 153.

[22] Schaffhausen "The Day His World Stood Still."

[23] Corkin 2002, pg. 153.

[24] I address the possibility that Henry has KT but that it is beyond conscious access, or that he is merely incapable of verbal expression of such knowledge, in Section VI below.

[25] Schaffhausen "The Day His World Stood Still", pp. 3-4

[26] Corkin 2002, pg. 154

[27] Corkin 1968.

[28] Ibid, pg. 257.

[29] Though attempts to reproduce H.M.'s mastery of the Tower of Hanoi Puzzle have met with mixed results. See Xu and Corkin 2001.

[30] Cohen and Eichenbaum 1993.

[31] For purposes of simplicity, I am ignoring complications involving Henry's short-term memory. That is, there may be short periods of time, right after Henry has completed the Rotary Pursuit Task, in which Henry can be said both to know how to perform the Rotary Pursuit Task and to know that such-and-such is a way to do the task (under a practical mode of presentation). However, after this short-term propositional memory fades (a few minutes later), Henry retains the knowledge of how to do the task but does not retain the knowledge that such-and-such is a way to do the task (under a practical mode of presentation).

[32] I am assuming a justified, true belief account of propositional knowledge (with perhaps something added to account for Gettier challenges). Henry's condition would be even more problematic for an internalist account of justification since Henry's lack of declarative memories would seem to imply that even if he could be said to have beliefs, his beliefs would likely lack justification.

[33] See, for example, Cohen and Eichenbaum 1993. Throughout the book, they theorize that procedural memory/knowledge uses "fundamentally different" kinds of representations from those used in declarative memory/knowledge (e.g. pg. 49 and Chapter 3). The upshot is that amnesics such as Henry cannot store and/or access the kinds of representations necessary for propositional knowledge and/or belief.

[34] Even in the case of subconscious beliefs of the sort Freud argued for, it is possible to bring them to conscious awareness over time via therapy. This is not the case with Henry.

[35] See Noë 2005, pp. 287-88.

[36] Noë 2005, pg. 286

[37] Ibid, pg. 290. Noë makes this point by invoking the example of non-human animals, which Stanley and Williamson discuss when considering objections to their view. Noë points out that "whether or not [dogs] can grasp propositions is an open question, one that is debated in cognitive science" (289). It is not something that can be settled by analysis of knowledge ascriptions.

[38] This is a topic/debate that has received surprisingly little attention among philosophers. Definitions of, and characterizations of, knowledge tend to consider only propositional knowledge (see, for example, *The Cambridge Dictionary of Philosophy*, and most other philosophical reference works). As such, when it comes to the question "what is knowledge?", the focus is on the justified, true belief account of propositional knowledge. There is not much philosophical discussion of what knowledge *simpliciter* might be, though Linda Alcoff and Vrinda Dalmiya consider the question in their 1993 article "Are Old Wives' Tales Justified."

[39] I am not endorsing these various accounts of knowledge-how, which I borrow from writings of Ryle and Katherine Hawley, among others. I am, rather, making the point that on those accounts of KH that have been given, Henry seems to qualify as possessing KH. See Ryle 1946 and 1949, and Hawley's 2003.

[40] This assumes that KH is more central to technological knowledge than theoretical scientific knowledge and that KT is more central to theoretical scientific knowledge than to technological knowledge. I don't argue for this point here, though I think it is true. Note that I am not making a straightforward identification between KH and technology, or between KT and theory. Both sorts of knowledge no doubt combine in complex ways at higher levels.