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Knowing How: An Empirical, Functionalist Approach

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**Abstract**

Only very recently has the subject of knowledge how and its relation to propositional knowledge, or knowledge that, been given much attention by philosophers. In recent debates on the subject, positions tend to divide around the question: is knowledge how (KH) reducible to, or a kind of, knowledge that (KT), or are they fundamentally distinct categories of knowledge? I argue for the latter view, and I base my argument on the claim that KH and KT mental states serve fundamentally different functional roles – specifically, KT is *representational*, while KH is *practical*. I develop my positive, Functionalist account of KH in Chapter 6.

Earlier chapters deal with background and methodological issues. In Chapter 1, I consider why philosophers, until recently, have tended to ignore the study of KH and have focused almost exclusively on KT. I argue that the omission is due to unexamined, tacit assumptions about the relation between mind and body, and the relation between knowledge and representation. In Chapter 2, I argue for an empirical approach to the debate, and develop a folk theory of KH to use as a starting point for the investigation. In Chapters 3 and 4, I consider specific empirical domains – neuroscience and experimental psychology – and examine some ways in which they inform the KH/KT debate. In Chapter 5, I critically consider an account of KH put forward by Jason Stanley and Timothy Williamson in a 2001 article, “Knowing How”, since theirs is the most prominent view opposed to my conclusion.
Knowing How: An Empirical, Functionalist Approach

By

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B.A., Bloomsburg University, 1995

Dissertation
Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Philosophy in the Graduate School of Syracuse University.

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Acknowledgements

This dissertation arose out of research into a much broader topic that I got interested in while taking philosophy of science courses with Brent Mundy. Convinced that something like Thomas Kuhn’s picture of theoretical scientific knowledge (as modified by Mundy) is correct, I began to wonder if a similar model might be applied to technological knowledge. In comparing and contrasting the two types of knowledge, it struck me that it might be useful to look into what had been said about the knowledge-how/knowledge-that distinction. I was prepared for a vast literature on the topic, and so was surprised to discover how little had actually been written about the subject by philosophers. I have much to say about that surprising discovery in the dissertation itself; before proceeding, let me express my gratitude to some of those who helped me, both philosophically and personally, over the years of working on this project, and the years leading up to it.

Brent Mundy, mentioned above, had a huge impact on my knowledge of, and approach to, philosophy and he was the person who made the original suggestion to look into the topic of technological knowledge. Many other professors, both graduate and undergraduate, had strong influences on me as well including William Alston, Jose Benardete, Jonathan Bennett, Richard Brook, Tamar Gendler, Steven Hales, Wendy Lee, and Scott Lowe. I also had a influential colleagues as a graduate student at Syracuse, including Jason Clark, John Draeger, Eric Funkhouser, Jeff McDonough, and Erik Schmidt.

My clarification for this dissertation was in 2005, and due to a number of factors (including adjunct teaching at as many as four different local colleges per semester) its completion has taken longer than usual. As such, I owe a great debt of gratitude to committee members who have worked with me and accommodated my irregular schedule over those years.
(which generally consisted of a flurry of chapter submissions in the summer, followed by long months of silence, followed by another flurry the next summer, etc.). Ishani Maitra has been extraordinary in this respect. Her guidance has been incredibly constructive and I’m not sure I would’ve ever finished this project without her help.

Committee members Mark Heller and Andre Gallois have also been around for the long haul. Mark was good enough to take over as my dissertation advisor after Ishani left, and both have provided lots of constructive advice along the way. Linda Alcoff, Bence Nanay and Robert Van Gulick have given me comments on particular chapters, and Larry Hardin helped give the project some shape at the beginning. Hille Paakkunainen was incredibly helpful in the home stretch. I approached her, a new faculty member, because some of her papers had some connections to my topic, and before I knew it she (well, we) had done a complete critical review of the dissertation. Her comments were uniformly valuable.

Over the course of writing this dissertation, my life has changed rather dramatically. Meeting and marrying my wife, Farhana, turned my life around in more ways than I can mention. Without her inspiration, I don’t think I would’ve had the spirit to finish, and without her patience, encouragement, and love I wouldn’t have had the ability. She has been an ideal partner, and watching her defend her dissertation last year, a few weeks before giving birth to our third child, was a great source of motivation.

Our children, Sophia, Eli and Zak, are also great sources of motivation as well, not to mention sources of philosophical inspiration. Watching them grow up and acquire all sorts of know-how has made the importance of this dissertation subject more than just academic to me. And their energy and good cheer is the perfect complement to days (and years) of sustained, concentrated philosophical work.
My mother and father, Bridget and William Bzdak, have always emphasized the value of education, and have been a constant source of help and support over the years. My brothers, Brian and Patrick, have also been supportive, and our variety of aptitudes with respect to the different types of knowledge have no doubt affected my thinking on this subject. Finally, my in-laws, the Syeds of Pune, India, have been astonishingly kind and welcoming to me, and enthusiastic boosters of my career.

In 2010, I was hired as an assistant professor at Onondaga Community College. To have such a job at all in this job market is a blessing, but I have the additional good fortune to have Patrick Kenny as a colleague. His help as both a co-worker and a philosopher has been invaluable. He and others who teach philosophy at OCC, including Alex Krantz, Ben Hassman, Jeremy Dickinson, and Jeremy Pierce, have kept my interest in the discipline alive and growing. At OCC, the discipline of philosophy is housed in the Social Sciences Department, and all of my colleagues in the department have been enthusiastic, motivational and great to work with.
# Table of Contents

Acknowledgments ........................................................................ iv

Introduction: Knowing-How ............................................................... 1

Chapter 1: The Puzzle of Knowledge How ........................................ 22

Chapter 2: A Folk Theory of KH ...................................................... 59

Chapter 3: Neuroscience and Knowing-How .................................... 103

Chapter 4: Intelligence and Knowing-How ....................................... 136

Chapter 5: Stanley and Williamson on Knowing-How ....................... 185

Chapter 6: A Functionalist Account of Knowing-How ..................... 225

Bibliography .................................................................................. 271

Biographical Data .......................................................................... 281
**Introduction: Knowing How**

*Sam:* Does anyone here know anything about plumbing?
*Cliff:* Well, Sam, the Romans had an elaborate system of aqueducts...
*Sam:* No, no, Cliff...what I mean is does anyone here know how to fix plumbing?
*Cliff:* Ah, no – sorry Sammy...strictly theory.¹

### I.1 The Sounds of Silence

As the above exchange illustrates, we typically distinguish between at least two kinds of knowledge²: knowledge-that and knowledge-how. Knowledge-that is also sometimes referred to as propositional knowledge, declarative knowledge, or descriptive 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 in the analytic tradition 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). While it is true that philosophical recognition and awareness of KH as a (possibly) distinct category of knowledge goes back to the ancient Greeks,³ analysis of the nature of KH and its relation to KT has barely begun. Given the preeminent philosophical role that epistemology has played since (at least) Descartes, this lack of

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¹ From a 1985 episode of the sitcom *Cheers*.

² Philosophers have argued that other kinds of knowledge exist as well – e.g. knowledge by acquaintance, moral knowledge, etc. And of course, these kinds of knowledge are often further subdivided into finer categories such as *a priori*, *a posteriori*, etc.

³ Though it does not seem to be the case, as some have thought, that the distinction between the Greek concepts of *epistemē* and *techne* tracks the KT/KH distinction as described above. See “Plato on Knowing How, Knowing That, and Knowing What” in Hintikka (1974).
attention is prima facie puzzling. If KH is genuinely a fundamental category of knowledge, and philosophers are interested in distinguishing and studying the fundamental categories of knowledge, then, syllogistically, philosophers should be interested in KH. Some are, of course, but not many, judging by what has been written on the subject.  

The first part of this dissertation, then, addresses this puzzling silence with respect to KH. It involves first, demonstrating that philosophers have been (relatively) silent on the subject; second, exploring possible reasons for the silence; and third, defending the claim that KH is, in fact, a topic that deserves increased philosophical attention.

I.2 An Empirical Approach

A mere increase in philosophical attention to the topic of KH is unlikely to advance the discussion unless it involves the right sort of attention. In the second part of the dissertation I begin to develop and argue for a new approach to the subject of KH – an approach that goes beyond the typical philosophical methodologies of conceptual and linguistic analysis and takes into account the results and data generated by a host of empirical sources that have heretofore been ignored (or mostly ignored) by epistemologists. Consideration of these other resources will provide a fuller picture of the phenomena in question and lead to a more complete theory about their nature and relation.

In fact, I will argue that full consideration of the available resources – phenomenological, conceptual, linguistic, empirical, etc. – lends strong support to the conclusion that KH and KT are distinct fundamental categories of knowledge and that it is not the case, as some have argued, that KH is reducible to, or a species of, KH. This conclusion is not based on any one particular argument, or data set, or on results derived from any one methodology or discipline. Rather, it is

4 Until very recently, that is. In the last few years, there has been a burst of interest in the subject, and an explosion of articles and books on KH and its relation to KT. Jason Stanley and Timothy Williamson’s 2001 article on the subject is usually credited with igniting the revival.
a ‘preponderance of evidence’-type argument in which I will attempt to demonstrate that the preponderance of the available evidence supports the conclusion that KH and KT are distinct. I am not the first to argue for this conclusion, but my approach – which I call an ‘empirical approach’ because its incorporation of, and emphasis on, the relevant empirical data from both physical and social sciences – is unique, so far as I know.

This shift in focus that I am advocating – from conceptual/linguistic analysis to a broader empirical investigation – has parallels in other philosophical domains (and sub-topics within those domains) including epistemology\(^5\), philosophy of color\(^6\), and philosophy of science.\(^7\) In these cases (and others), a broader approach to the topic – one that involves investigation into, and consideration of, the work done in other (often empirical) disciplines – has led to significant advances in our understanding of those topics. I will demonstrate that the study of KH (and its relation to KT) can be similarly advanced by moving toward such an empirical, or naturalized, approach.

What sorts of evidence, previously ignored or underappreciated by philosophers, might inform the discussion of KH (and its relation to KT)? Examples of the kinds of considerations I have in mind include the following:

(i) It is relatively uncontroversial that activities such as acquiring and demonstrating KH have a different phenomenological feel from acquiring and demonstrating KT.\(^8\) And it’s not simply different in the same way that the taste of an apple has a phenomenologically different feel from the taste of an orange. Learning and demonstrating one’s knowledge of how to ride a bike (i.e. knowledge of a skill or ability) seem, from the inside, like fundamentally (qualitatively)

\(^5\) **Empirical, or “naturalized”** epistemology is usually associated with W.V.O. Quine. For an excellent discussion of naturalism and epistemology see Kitcher (1992).

\(^6\) See, for example, Hardin (1988).

\(^7\) See, for example, Kuhn (1962).

\(^8\) Ryle notes that this is a “…distinction which is quite familiar to all of us” in Ryle (1946), p. 215.
different kinds of experiences from learning and demonstrating one’s knowledge of the U.S. state capitals (i.e. knowledge of propositions or facts).

This phenomenological difference is rarely mentioned by philosophers who consider KH and KT, perhaps because phenomenological considerations alone are rarely conclusive evidence for drawing substantive conclusions, since such evidence has often turned out to be deceptive or unreliable. For example, the phenomenology of a stubbed toe indicates that pain is located in the throbbing digit, while modern science (and phenomena such as phantom limbs) indicates otherwise. Another possibility is that philosophers, while avoiding *direct* consideration of phenomenological evidence, do take such evidence into account in doing conceptual analysis. After all, the formation of concepts (especially concepts related to mental states) is no doubt influenced by our phenomenological experiences. In a sense, then, philosophers might claim both that they do not ignore phenomenological evidence and that the minor role it plays in their deliberations is well deserved, given its nature and track record.

However, while it is true both that phenomenological evidence is seldom conclusive, and also that it does play a role in conceptual analysis, it nevertheless deserves more consideration than it has received. This is because the phenomenological differences involved in acquiring KH and in acquiring KT could indicate actual substantive differences between these two kinds of knowledge. As such, the phenomenological evidence is important as a jumping-off point for empirical investigation of KH and its relation to KT. Such an investigation could reveal whether or not KH really is a different sort of thing than KT, or whether the distinct phenomenological ‘feels’ associated with activities related to KH and KT are deceptive – like the illusion that the pain associated with a stubbed toe is located in the toe itself.
Furthermore, even if the phenomenological evidence turns out to be mistaken or illusory, it is still data that a plausible account of KH should explain. Why do these two things seem so different if it is really the case that they are not? The ability (or inability) to explain our experiences, even if they are not veridical, can lend (or subtract) plausibility to an account of KH, and perhaps help us to decide between competing accounts.

(ii) Other evidence that bears further empirical scrutiny comes from a large number of everyday, “commonsense” observations, some examples of which were noted by Gilbert Ryle who ignited the modern debate about KH and its relation to KT in his 1949 book, *The Concept of Mind*. For example, Ryle points out that it is both possible and common for a person to know how “to make good jokes and how to detect bad ones” but not to be able “to tell us or himself any recipes for them”. In other words, it seems that KH can exist in the absence of explicit or conscious KT. Ryle also points out that the inverse of this seems true as well – i.e. one can possess all kinds of theoretical knowledge about joke-telling without thereby being funny.

Similarly, from the observations that one can be a good teacher or coach and yet not be a good performer (and vice versa), and that one can be well-versed in normative theory and yet behave inappropriately, Ryle concludes that the two types of knowledge often come apart in practice.

Such observations presumably contribute to the background against which conceptual analysis proceeds (as noted in the case of the phenomenological evidence, above). And it may turn out, as some philosophers have suggested, that in such cases implicit or tacit KT is involved (which, again, implies that such evidence is not conclusive in establishing a distinction between KH and KT). But these phenomena, in addition to contributing to the analysis of the relevant concepts, should also be part of the data that informs an empirical

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9 Ryle (1949). See especially Chapters 2 and 5
10 Ibid., p. 30.
11 See, for example, Polanyi (1957).
investigation of KH and its relation to KT – and which a satisfactory account of KH should be able to explain.

(iii) Additional data which should be incorporated into the discussion of KH comes from recent findings in the sciences, both hard (e.g. neuroscience) and soft (e.g. psychology, educational theory, technological studies, etc.). For example, for the past few decades neuroscientists have been using new technologies to study the neurological correlates of knowledge. In a 1980 article from *Science*, authors Neal J. Cohen and Larry R. Squires conclude (based on studying the brains of patients with a certain kind of amnesia) that: “the experimental findings described here provide evidence that such a distinction [between KT and KH] is honored by the nervous system.”¹² Since then, there has been a somewhat extensive debate about this question among brain scientists (especially those concerned with memory). In a 1999 article, biologists Eric Kandel and Christopher Pittenger concluded that the distinction between KH and KT is “now generally accepted as being well-founded biologically.”¹³ Not everyone agrees with this conclusion¹⁴, but philosophers seem unaware that this scientific debate even exists.

(iv) Another potential neurological source of data for this distinction comes from the study of human (and primate) visual systems. It is well-established that our visual system has two distinct processing pathways, or streams, usually referred to as the “ventral” and “dorsal” streams. The difference between the two streams is described by psychologists A. David Milner and Richard T. Dyde as follows:

The “dorsal stream” plays a rather direct and automatized role in the visual control of action, whereas the “ventral stream” underlies the construction of our conscious visual percepts and provides inputs into cognitive processing systems. The

¹⁴ See, for example, Willingham and Preuss (1995).
ventral stream enables the initial storage and later recognition of objects, scenes, and events, and the evocation of visual imagery about them. Consequently, it can inform actions carried out at a temporal or spatial distance from the visual input. The dorsal stream is concerned, not with the past or future, but with the successful implementation of goal-directed motor acts in the “here and now.”

There are a number of reasons for accepting the existence of these distinct systems. One prominent argument involves experiments that demonstrate that certain optical illusions which affect visual processing do not affect motor abilities. For example, subjects who view a stationary object in front of a moving background will report that they (falsely) see the stationary object as moving in the opposite direction as the moving background. However, if asked to point to or touch the object, they are successful in doing so. To put it a bit crudely, the ventral stream has been fooled, while the dorsal stream has not.

Again, a prima facie conclusion to draw from this sort of evidence, is that it is consistent with the claim that there is a fundamental distinction between KH and KT.

(v) Another area of contemporary debate that is relevant to the topic of KH and KT is in the field of intelligence studies. Since IQ tests came on the scene in the early 20th century, disagreements have raged among cognitive scientists and experimental psychologists (among others), about the nature of intelligence. Critics of such tests have often pointed out that they are too narrowly focused. As education theorists Howard Gardner and Thomas Natch pointed out in a 1989 article:

Most definitions of intelligence focus on the capacities that are important for success in school. Problem solving is recognized as a crucial component, but the ability to fashion a product – to write a symphony, execute a painting, stage a play, build up and manage an organization, carry out an experiment – is not included, presumably because the aforementioned capacities cannot be probed adequately in short-answer tests.

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15 Milner and Dyde (2003), p. 3.
In response to such concerns, Gardner developed a theory of Multiple Intelligences (MI) which posits seven different kinds of intelligence with “no necessary correlation” (7) between them. Some of these intelligences correspond roughly to KT (e.g. logical-mathematical intelligence, linguistic intelligence), others to (at least some kinds of) KH (e.g. spatial intelligence, bodily-kinesthetic intelligence), and yet others to neither (or perhaps both) (e.g. interpersonal and intrapersonal intelligences).

Gardner’s MI theory is controversial, and it is not the only alternative to traditional views about intelligence that could inform the KH/KT debate. Such theories are part of a long and growing debate among researchers in intelligence-related fields – a debate that has generated a great deal of empirical work on intelligence-related topics. Even those who believe, contra Gardner, that intelligence tests measure something unitary and real – usually referred to as g, for general intelligence – agree that this general intelligence correlates poorly with many of the sorts of skills and abilities that are paradigm examples of KH. This empirical work on intelligence – which attempts to test claims about disparate kinds of intelligence and the relations between them – has also been systematically overlooked in the KH/KT philosophical literature.

(vi) Educators and education theorists have an interest in the debate about KH and KT and not surprisingly, the topic has received much attention from education-related disciplines (some of which overlaps with the concerns about intelligence, discussed in (iv) above). For example, philosopher of education Gary Fenstermacher has pointed out that:

If educational policy is grounded in weak or erroneous assumptions about the nature of knowledge, there is a high likelihood that it will fail to address the problems and aspirations of education in positive and ameliorative ways.18

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17 Also prominent is a theory, called the Gf-Gc Theory, that distinguishes between “fluid” intellectual abilities and “crystallized” intellectual abilities. The theory was developed by John Horn and Raymond B. Cattell. See for example Horn (1989).
It is not a huge step to see that the relation might go the other way as well. That is, if education policies are grounded in certain epistemological assumptions, and they “fail to address the problems and aspirations of education in positive and ameliorative ways”, then those assumptions might well be called into question. And indeed, some theorists have criticized the epistemological divisions of knowledge as being counterproductive when applied to the practice of education.\(^9\)

\[\text{(vii) Others taking part in the discussion of KH, or making use of something like the distinction between KH and KT (unbeknownst to many philosophers, it seems), include those writing about economics/decision theory}^{20}\text{, technology}^{21}\text{, psychopharmacology}^{22}\text{, molecular biology}^{23}\text{, evolutionary theory}^{24}\text{, and artificial intelligence}.^{25}\text{ While it is not clear that all of these disciplines and their discussions of KH and KT bear directly upon the philosophical questions at hand, their results and conclusions are certainly worthy of consideration.}\]

I catalog KH/KT issues related to phenomenological data, personal and interpersonal experience, and cultural/social practices in Chapter 2, where I develop a folk theory of KH, or Folk KH. The idea is to present a broad, general, pre-theoretical picture of KH – including such aspects of KH as its nature, commonly held characteristics, personal and social role, and relation to KT. Folk theories are not necessarily reliable accounts of the relevant phenomena, but they provide a starting point against which to test and compare philosophical accounts of KH.

I will not, in this dissertation, have the opportunity to adequately survey all of the empirical domains mentioned above. But I will consider at length some of the abovementioned

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\(^9\) For example, Lum (2003).
\(^{20}\) See, for example, Lesperance, Levesque, et. al. (2000).
\(^{21}\) See, for example, Pitt (2003).
\(^{22}\) See, for example, Kumari, Corr, et. al. (1997).
\(^{23}\) See, for example, Sahdra and Thagard (2003).
\(^{24}\) See, for example, Nelson and Nelson (2002).
\(^{25}\) See, for example, Singh (1999).
issues in the neurological domain (Chapter 3) and in the psychological study of intelligence (Chapter 4).

I.3 Contrasting Approaches

After making the case for an empirical approach to the study of KH, I will turn to critical consideration of some of the philosophical work done on the subject. In particular, I will examine Stanley and Williamson’s account of KH, which involves the claim that KH is a species of (but not reducible to) KT. I focus on their account because of its centrality in the recent philosophical literature on the subject, and because it is the most prominent account that denies one of major conclusions I reach in this dissertation – the claim that KH and KT are fundamentally different categories of knowledge, with neither reducing to, or a species of, the other. I ultimately argue that Stanley and Williamson’s approach does not provide a satisfactory account of KH (and its relation to KT), and that their methodological approach to the subject is flawed.

As noted in section I.1 above, the philosophical literature on KH has been relatively sparse. But the silence with respect to KH, while puzzling, has not been complete. Ancient thinkers from Greece and Asia recognized something like a categorical distinction between KT and KH, though without providing any sort of analysis of the distinction. Early modern philosophers were conspicuously silent on the subject, and it was not until relatively recently that the subject was revived.

The modern philosophical work that has been done on this topic begins with the writings of Gilbert Ryle. In his 1946 Presidential Address to the Aristotelian Society26 (PAAS) and in his book The Concept of Mind.27 Ryle drew attention to the abovementioned epistemological

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26 Later printed as: Ryle (1946) and in Ryle (1971). Page references are from the latter source.
27 Ryle (1949). See especially Chapters 2 and 5.
lacuna. Furthermore, he claimed that the explanation for this gap is that philosophers have generally held that KH is somehow subsumed under the broader category of KT. More specifically, Ryle claimed that the general view (which he was challenging) was that knowing how to do something, like fix the plumbing, involves knowing that the rules for fixing plumbing are thus-and-so, and then simply applying those rules to the pipes. Roughly put, then, Ryle’s claim is that KH has been conceived of as a sort of applied KT by most philosophers, and therefore has not required separate study.

Adopting such a view, according to Ryle, is one of many conceptual errors that philosophers make which ultimately stem from holding a mistaken theory of mind. Once this mistaken theory is rejected and replaced with a more accurate account of the mind, Ryle argued, philosophers would come to recognize that KH is not simply applied KT, and that furthermore, KH is actually logically prior to KT.  

I.4 Ryle’s Methods

Ryle argues for his conclusions with respect to KH and KT largely by using the related methodologies of (a) conceptual analysis, and (b) linguistic analysis. Conceptual analysis involves, roughly speaking, investigating the meaning of a concept by examining the ways in which it is typically used in ordinary language. For example, the concept of ‘personal identity’ is often analyzed by considering conditions under which we would say of someone that he/she is the same person (e.g. before and after a haircut) and/or conditions under which we might say that he/she is a different person (e.g. before and after a severe brain injury). From such examples,

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28 The mistaken theory, according to Ryle, sees minds as Cartesian ghosts-in-the-machine. On this view knowledge is typically viewed as the product of an inner contemplation of thoughts and/or ideas.

29 Ryle’s preferred theory of mind was behaviorist, where knowledge is seen as dispositional in nature (or at least that is how he is usually interpreted, though there are some who disagree – cf. Chapter 6, section 6.7.1).

30 Some argue that Ryle’s “distinctness” claim is inconsistent with his view that knowledge is dispositional. More on that topic below, and in later chapters.

31 Such investigations often boil down to searches for necessary and sufficient conditions, though this is not Ryle’s stated goal in The Concept of Mind.
we might conclude that the meaning of ‘same person’ necessarily involves the notion of psychological continuity but not ‘follicular’ continuity. Or, put another way, we might conclude that hair is irrelevant to personal identity since it is perfectly consistent to say that “Joe is the same person today as he was yesterday” and “Joe had a haircut yesterday” (other things remaining the same). Psychological continuity, on the other hand, might be deemed necessary to personal identity since it might be judged inconsistent to say that “Joe is the same person today as he was yesterday” and “Joe has none of the memories, mental abilities, personality traits, etc. that he had yesterday”.

Ryle adopts conceptual analysis explicitly in arguing against the traditional views about KH and KT. In the introduction to *The Concept of Mind*, for example, he writes that his goal is to “rectify the logical geography” of mental concepts (such as KH and KT), which involves:

…reveal(ing) the logic of the propositions in which they are wielded, that is to say, to show with what other propositions they are consistent and inconsistent, what propositions follow from them and from what propositions they follow.

Ryle, good to his word, pursues this goal throughout *The Concept of Mind*. For example, at one point Ryle distinguishes KH and KT by noticing that “(w)e never speak of a person having partial knowledge of a fact or truth…On the other hand, it is proper and normal to speak of a person knowing in part how to do something…” And elsewhere:

…we never speak of a person believing or opining *how*, and though it is proper to ask for the grounds or reasons for someone’s acceptance of a proposition, this question cannot be asked of someone’s skill at cards or prudence in investments (Ryle’s emphasis).

Differences such as these, according to Ryle, contribute to the conclusion that KH is not merely a kind of KT. Ryle also uses conceptual analysis to formulate his central argument against the

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32 This is, admittedly, a massive oversimplification of a complex process (and topic). Here, the point is simply to illustrate this methodology.
34 Ibid., p. 59.
35 Ibid., p. 28.
orthodox view that KH is a kind of KT – namely, that this view of KH leads to an infinite regress (to multiple infinite regresses, actually).

Ryle also employed the (related) method of linguistic analysis in his quest to undermine the philosophical tradition of perceiving KH as merely applied KT\textsuperscript{36}. Linguistic analysis involves comparing the structures of sentences (and other linguistic contexts) in which the relevant terms appear in order to draw conclusions about the meanings of those terms (or the nature of the things named by the terms). For example, Ryle claimed that the rules and principles that guide instances of KH (e.g. the rules for how to bake a cake) are generally expressed in the imperative mood (e.g. “mix the flour, eggs, and sugar together”); and that “we cannot call an imperative a truth or falsehood”\textsuperscript{37} as is the case with ascriptions of propositional knowledge. This grammatical difference, according to Ryle, points to a difference in the two kinds of knowledge.

Ryle repeatedly used this type of analysis to challenge the traditional view that performing a skill is merely applying (propositional) knowledge to a particular activity – and therefore that ‘thinking’ is a different sort of activity than ‘doing’. The linguistic evidence speaks against this notion, according to Ryle, who argued that the acceptability of expressions such as ‘stupid thinking’ and ‘intelligent thinking’

…helps to upset the assumed type-difference between thinking and doing, since only subjects belonging to the same type can share predicates. But thinking and doing do share lots of predicates, such as ‘clever’, ‘stupid’, ‘careful’, ‘strenuous’, ‘attentive’, etc.”\textsuperscript{38}

\textsuperscript{36} I do not mean to suggest a hard-and-fast distinction between these two methodologies. They are both concerned with examining and analyzing our use of language in order to derive conclusions about the given subject. However, conceptual analysis is generally concerned with meanings and logic of concepts whereas linguistic analysis is generally concerned with the grammatical structures of sentences (and other linguistic contexts). Of course, the two kinds of consideration can, and do, overlap.


\textsuperscript{38} Ryle (1946), p. 212.
In other words, if the traditional view – that thinking is a more basic kind of thing than doing – is right, then certain sentence constructions (such as ‘he reasoned cleverly’ and ‘he fought cleverly’) should not both be acceptable. But the fact that the same predicates apply to both kinds of activity implies, according to Ryle, that there is no type difference.

### 1.5 The Road Since Ryle

The point here is not to endorse the arguments that Ryle makes, but rather to give a sense of the origins of the modern debate on the topic of KH as well as to demonstrate the methodologies involved. This is relevant in that philosophers who took up the discussion of KH (and its relation to KT) after Ryle generally relied upon the same kinds of conceptual and linguistic considerations that he did. For instance, John Hartland-Swann, one of the earliest commentators on Ryle’s elucidation of the KH/KT distinction, argued that “this distinction, though valuable for clarificatory purposes, is fundamentally unstable and cannot survive [conceptual] analysis”.

Hartland-Swann reasoned that since all knowledge claims were to be classified as dispositional on Ryle’s account, then “all cases of knowing that can ultimately be reduced to cases of knowing how” (emphasis in the original).

David Carr has argued in support of the conclusion that KH and KT are distinct by pointing out that ascriptions of KH and ascriptions of KT have very different linguistic structures. He writes that:

…”it is important to note that whereas the objects of theoretical knowledge are something like statements or propositions, practical knowledge is directed towards action and the signs that occupy the object positions of knowing how contexts invariably keep place for characterizations of actions and activities rather than expressions of propositions or bits of evidence or information.”

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41 Carr (1981), pp. 54-5.
In other words, the object of knowledge in a KT ascription (such as “John knows that snow is white”) is a proposition whereas the object of knowledge in a KH ascription (such as “John knows how to ride a bicycle”) is non-propositional (it is an infinitive specifying an activity).

More recently, Jason Stanley and Timothy Williamson “appeal to well-entrenched doctrines of linguistic theory” to argue that, contra Ryle, KH really is just a kind of KT.\(^\text{42}\) “Ascriptions of knowledge how,” they conclude, “are ascriptions of propositional knowledge.”\(^\text{43}\) That, in turn, implies that “knowledge-how is simply a species of knowledge-that.”\(^\text{44}\) Stanley and Williamson’s article has sparked a revival of the topic and their account of KH (as a species of KT) has, unsurprisingly, provoked opposition – including the charge that it leads to regress problems similar to those that Ryle claimed for the traditional view.\(^\text{45}\)

I.6 Methodological Myopia

So, while some philosophers writing on this subject since Ryle have disagreed with his conclusions, almost all have nevertheless followed his lead with respect to the kinds of arguments employed – namely, arguments focusing on conceptual and linguistic evidence. I will argue that it is shortsighted to rely solely on conceptual and linguistic considerations, as has been the case to date. This focus is unsatisfactory for a number of reasons. First, relying solely on these sorts of considerations has led to very little progress in the debate about KH and its relation to KT. As evidence, consider the fact that basic terms of the debate remain undefined and basic questions unaddressed. For example, much of the literature on KH and KT involves attempts to answer questions about the nature of the relation between the two kinds of knowledge (e.g. is KH a kind of KT, or vice versa, or are they distinct and independent forms of knowledge?). In

\(^{42}\) Stanley and Williamson (2001), p. 444.
\(^{43}\) Ibid, p. 420.
\(^{44}\) Ibid, p. 411.
\(^{45}\) See, for example, Koethe (2002) and Noë (2005).
Ryle’s discussion of this topic, he tends to talk in terms of one kind of knowledge being (or not being) ‘reduced’ to the other; but he also employs relational terms such as ‘logically prior to’, ‘model of’, ‘parent of’, ‘stepchild of’, ‘built up out of’, ‘defined in terms of’ and ‘prefaced by’. Other relational terminology used in such discussions includes: “sub-category of”, “special case of”, “unpacked from”, “analyzed with reference to”, “formally similar”, “logically distinct”, “subsumed under”, and “distinct but equal”. Some of these terms are roughly synonymous, but others could be seen as denoting stronger or weaker relationships. And few of them are ever defined explicitly in the context of this debate about knowledge. What exactly does it mean to say that KH is a species of KT, anyway? And how is it different from saying that KH is reducible to KT? That such questions continue to go unanswered and unaddressed is some evidence that the discussion surrounding this topic has not made much progress in the years since Ryle took it up.

A second (and related) reason for dissatisfaction is that while conceptual and linguistic data have been the sole focus of the debate about KH and its relation to KT, no consensus has arisen with respect to interpretation of this data. For example, an early discussion of Ryle’s conclusions (with respect to KH and its relation to KT) took place in Analysis in the 1950s. One participant in that debate, John Hartland-Swann, considered the evidence presented by Ryle and

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46 Others who tend to talk about the relationship in terms of ‘reduction’ include Scheffler (1968) and Roland (1958).
47 Examples are from both Ryle (1946) and Ryle (1949).
48 Hartland-Swann (1957).
49 Ibid.
50 Hartland-Swann (1956).
51 Carr (1979).
52 Carr (1981).
53 Ammerman (1957).
54 Roland (1958)
56 That these are different relations is a claim argued for in Stanley and Williamson (2001), where the authors argue that KH is a species of KT but that it is not reducible to KT (see, esp. pp. 433-4).
argued that it led to conclusions directly opposed to those Ryle had drawn.\textsuperscript{57} Robert Ammerman, in a reply to Hartland-Swann, disagreed.\textsuperscript{58} Later, philosophers such as David Carr came up with new arguments to support Ryle’s conclusions.\textsuperscript{59} These arguments were often based on more detailed considerations of the conceptual and linguistic data than Ryle himself had made. But again, such arguments rather than settling questions, merely raised new challenges. Stanley and Williamson, for example (as noted above), appealed to “well-entrenched doctrines of linguistic theory”\textsuperscript{60} to challenge Carr’s arguments and conclusions. Then, Stanley and Williamson’s conclusions were vigorously challenged as well, including the charge (again, as noted above) that their linguistic analysis was underwhelming, or inaccurate, and that their account of KH leads to regress problems similar to those that Ryle claimed for the traditional view that he was challenging.

While it would be incorrect to conclude that the debate about KH and KT has thus made no progress, and has come full circle (since new arguments have been developed and new data introduced since Ryle’s work on the subject), there is nevertheless a seesaw quality to the debate which suggests, perhaps, that the kinds of data being used are insufficient to move the discussion about KH and KT forward. While such a rut is not conclusive evidence of the sterility of these kinds of arguments (perhaps a knock-down linguistic argument for the independence of KH and KT is waiting in the wings), it does provide some motivation for looking elsewhere for further guidance.

Finally, in addition to the sterility of these methods, there are also more direct reasons to be skeptical about the application of linguistic and conceptual analysis to the topic of KH and

\textsuperscript{57} Hartland-Swann (1956) and (1957).
\textsuperscript{58} Ammerman (1957).
\textsuperscript{59} Carr (1979).
\textsuperscript{60} Stanley and Williamson (2001), p. 444.
KT. Ryle, ironically, suggests the problematic nature of these methodologies himself when he writes things such as:

…philosophers and laymen tend to treat intellectual operations as the core of mental conduct; that is to say, they tend to define all other mental-conduct concepts in terms of concepts of cognition. They suppose that the primary exercise of minds consists in finding the answers to questions and that their other occupations are merely applications of considered truths or even regrettable distractions from their consideration. The Greek idea that immortality is reserved for the theorising part of the soul was discredited, but not dispelled, by Christianity.  

If, as Ryle claims, this mistake (of treating “intellectual operations as the core of mental conduct”) has been made by both “philosophers and laymen” alike for thousands of years, then it seems quite possible that it has affected the way we use knowledge-related terms in ordinary language, and has thereby infected our intuitions about KH and KT. The methodologies of conceptual and linguistic analysis assume a tight connection between the way we talk (and think) and the way things are, but mistakes such as those cited by Ryle above make the notion of such a tight connection suspect. It is always possible that our intuitions (which influence conceptual analysis), and linguistic practices (which are the basis for linguistic analysis) simply might not match up with the way the world is. Ryle recognizes such a possibility when he writes that:

This special use of ‘mental’ and ‘mind’ in which they signify what is done ‘in one’s head’ cannot be used as evidence for the dogma of the ghost in the machine. It is nothing but a contagion from that dogma.

It seems possible that similar ‘contagion(s)’ could call into question much of the linguistic evidence marshaled on both sides of this debate.

I do not wish to suggest that philosophers have contributed nothing to the debate about KH and KT. Philosophers from Ryle, to Carr, to Stanley and Williamson have accumulated conceptual and linguistic data related to KH (and its relation to KT) and such evidence, and the

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arguments based on it, must be taken into consideration by anyone proposing or evaluating an account of KH and weighed accordingly. An adequate account of KH should have something to say about this sort of evidence. However, such evidence should be considered in light of, and integrated with, the rest of what is out there. The empirical approach I develop in this dissertation does exactly that.

I.7  My Account of Knowledge How: KH Functionalism

In the final chapter of the dissertation, I present my approach to KH, and its relation to KT, based on the evidence accumulated in previous chapters, and on considerations related to other accounts of KH. Central to my account is the claim that what distinguishes the two types of knowledge is the role (or function) that they play in the mind. The central functional role or purpose of a piece of propositional knowledge (or a KT mental state) is *representational* – that is, to have knowledge of a proposition is to have an accurate view, picture, or map of the world (or some part of it). Propositions aim for truth, which is generally going to get cashed out in terms of an accurate fit to the world.

The central function of a particular bit of KH is *not* representational. Rather, knowledge of how to do something aims at action, achievement, success, getting something done, etc. The goal of learning how to ride a bicycle, for example, is not to gain an accurate representation of the world (or some part of it) – though having such a representation might be useful or even necessary in acquiring such knowledge. The functional role that such a piece of knowledge (or a KH mental state) plays, rather, is *practical*. It allows for the exercise of an ability.

Because this functional distinction is central to my account of KH (and its relation to KT), I call my account KH Functionalism. I give a general overview of my account in Chapter 6, piggybacking on Functionalism as a theory of mind – which holds that mental states should be
characterized in the terms of the functional roles that they play, rather than on their underlying material constitution. What does a functional characterization of a mental state look like? Here is a common example used to illustrate the idea:

   For (an avowedly simplistic) example, a functionalist theory might characterize pain as a state that tends to be caused by bodily injury, to produce the belief that something is wrong with the body and the desire to be out of that state, to produce anxiety, and, in the absence of any stronger, conflicting desires, to cause wincing or moaning. According to this theory, all and only creatures with internal states that meet these conditions, or play these roles, are capable of being in pain.\footnote{Levin (2009).}

   More generally speaking, the functional account of a particular mental state is given in terms of the sorts of inputs that tend to give rise to that state (e.g. bodily injury), the connections that that state has to other mental states (e.g. the belief that something is wrong, the desire to be out of that state, anxiety, etc.), and the outputs brought about by that state (e.g. wincing, moaning). Because Functionalism characterizes mental states in terms of their functional role, it allows for the possibility that beings that are differently constituted from human beings could have (or be in) such states – which is appropriate for knowledge states as well as pain states. In Chapter 6, I explain KH Functionalism and characterize KH and KT states in functional terms. I then discuss the advantages of KH Functionalism over other accounts of KH, and finally, I consider and respond to some objections that might be raised against KH Functionalism. Throughout the chapter, I connect KH Functionalism to material from previous sections of the dissertation.

\subsection*{1.8 Conclusion}

   In summary, I develop an account of KH (and its relation to KT) that will incorporate not only the linguistic and conceptual data that philosophers have traditionally focused on, but also this relevant empirical data that has long been ignored in the literature. I will argue that the
preponderance of evidence points to the conclusion that KH and KT are, in fact, best thought of fundamentally distinct categories of knowledge, despite the important connections between them. While this conclusion is not itself original, the approach that I take is novel, and by its nature will give this conclusion much stronger support. I will compare my approach to previous approaches and argue that they have been too narrowly-focused, which has stymied progress. While the arguments and evidence from conceptual and linguistic analysis need to be taken into account, they need not be the sole focus of investigation, as has been the case.

An empirical approach to KH will take such evidence into account, but will integrate it with the findings from other disciplines. Such an approach, while new with respect to the study of KH, has been usefully applied to other topics of philosophical interest – for example: color, time and causality. It is difficult to imagine a philosopher contributing to topics like these without having at least some familiarity with the relevant empirical/scientific work that has been done in the area. A philosopher of color unaware of the opponent theory, or a philosopher of time unaware of relativity theory, or a philosopher of causation unaware of quantum theory, would probably not be taken very seriously with respect to the substantive conclusions she reached on that topic – even if such a philosopher were completely up-to-date on the linguistic properties of the related terms and ascriptions. The same should be said about philosophers who ignore much of the empirical data with respect to KH. In general, I share the sentiment expressed by C.L. Hardin in the preface of his book *Color for Philosophers*:

…discussions about color proceeding in ignorance of visual science are intellectually irresponsible. If this book should help to effect such a change in attitude, I shall think of it as a great success.\(^{64}\)

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\(^{64}\) Hardin (1988), p. xvi.
1.1 Introduction

In his book, *The Emergence of Probability Theory*, Ian Hacking devotes an introductory chapter to the question of “how such a fundamental concept as probability could emerge so suddenly” (and so late) in the 17th century. After all, it is likely true that “gambling may be a first invention of human society” – and yet “theories of frequency, betting, randomness and probability appear only recently”.\(^1\) One day, philosophers might be similarly curious with respect to the topic of knowing-how – another concept with a long history but which has only lately attracted sustained philosophical attention. While the phenomenon of knowing-how has itself long been recognized by philosophers, rigorous analysis of this kind of knowledge has only recently begun. And as in the case of probability, why this should be so is somewhat puzzling, given that knowing-how has played such a significant role in human thought and history. Imagine, for example, how different the world would be if no one knew how to grow crops, domesticate animals, construct a telescope, generate electricity, build a nuclear bomb, or program a computer.

The historical importance of such activities and abilities, and their connection to epistemological concepts, provides one reason as to why philosophers should be interested in knowledge-how. Another (related) reason is that knowledge-how is intimately connected with technological knowledge, and such knowledge has great potential to affect, both positively and negatively, virtually every aspect of our lives – from the price of the food we eat every day to our very survival as a species on this planet. Philosophers have begun to realize that technological knowledge and development have important normative implications for both individuals and

\(^1\) Hacking (1975), pp. 1-2. The introductory chapter of the book is entitled “An Absent Family of Ideas”.

societies, but have been much slower to take up consideration of the nature of such knowledge itself, as well as its relation to other kinds of knowledge (such as theoretical scientific knowledge). Such a project will, I propose, involve a comprehensive account of the nature of knowledge-how.

These social and practical implications are not the only reasons for philosophers to take up the topic of knowledge-how. There are other motivations that lie a bit closer to home. For example, given the assumption that knowledge-how is indeed a kind of knowledge, its study would seem to be of intrinsic value to epistemologists in general. In addition, as William Pollard points out, the burgeoning school of Virtue Epistemology “presupposes a viable form of the distinction [between knowledge-that and knowledge-how].” Furthermore philosophers have, at times, invoked knowledge-how to resolve (or to help resolve) various debates on non-epistemological issues. David Lewis and Laurence Nemirow famously invoked the notion of knowledge-how in an attempt to rescue physicalism from Frank Jackson’s Knowledge Argument. Michael Devitt and Hilary Putnam have invoked knowledge-how as an explanatory tool in philosophy of language. As Bengson and Moffett point out in their recent anthology on the subject, “…philosophical discussion of knowing how is intimately connected to a host of other debates converging on the nature of the mind and its relation to action”.

Despite these compelling and interesting reasons for a closer look at knowledge-how, philosophers have (until very recently) failed to take the bait. This puzzling dearth of

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2 Jared Diamond’s very popular *Guns, Germs and Steel: The Fates of Human Societies* (1999, W.W. Norton) explores these sorts of connections. Diamond is not a philosopher, but his work is similar to the work that many philosophers of technology (a small, but growing, sub-discipline) are doing.


4 See Lewis (1990), Nemirow (1990) and Jackson (1982).


6 Bengson and Moffett (2011). Bengson and Moffett’s anthology investigates connections between the subject of knowing how and a host of other philosophical topics including “ethics, philosophy of action, epistemology, philosophy of language, philosophy of mind, and cognitive science” (both quotes from p. viii).
philosophical attention paid to knowing-how (hereafter KH) was noted in a 1946 article by Gilbert Ryle, who initiated the modern discussion of the topic. Ryle wrote:

Philosophers have not done justice to the distinction which is quite familiar to all of us between knowing that something is the case and knowing how to do things. In their theories of knowledge they concentrate on the discovery of truths or facts, and they either ignore the discovery of ways and methods of doing things or else they try to reduce it to the discovery of facts. They assume that intelligence equates with the contemplation of propositions and is exhausted in this contemplation.  

In the nearly sixty years since Ryle made this observation, some valuable philosophical work has been done on the subject of knowledge-how. Nevertheless, the topic still occupies very little space in the modern philosophical discussion of knowledge, and it has garnered nowhere near the amount of philosophical attention that propositional knowledge, or knowledge-that (hereafter KT), has received. In what follows I will demonstrate and attempt to explain this puzzling silence.

More specifically, I will proceed as follows. First, I will make the puzzle explicit, in order both to analyze the topic from a more perspicuous vantage point, and to make it easier to survey possible explanations. Second, I will demonstrate that modern philosophers have had very little to say on the subject of KH, especially when considered relative to the philosophical attention paid to KT. I will do so by surveying various philosophy reference books and journals, as well as epistemology textbooks, and anthologies. Third, I will consider a number of possible solutions to this puzzle. Such solutions include the claim that philosophers really are not interested in all kinds of knowledge; the claim that KH is not really a kind of knowledge at all; and the claim that KH is straightforwardly identical to KT.  

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7 Ryle (1946), p. 225. Ryle also discusses knowing-how and knowing-that at length in Ryle (1949), especially Chapters 2 and 5.

8 I distinguish between the claim that KH and KT are straightforwardly identical and the claim that KH reduces to KT (or that KT is, in some other sense, prior to KH). The former claim is considered in section 1.4.1 below. The latter kinds of claims are considered in section 1.4.2 below. Note that priority relations such as ‘reduction’ are
inadequate solutions by showing that they are both implausible and that no philosopher seems to explicitly advocate or argue for them.

In the next part of this chapter, I will consider what seems to be the most plausible (and most common) attempt to resolve the puzzle, which is to claim that KH is reducible to KT (or that KT is in some other sense prior to KH). I argue, however, that this solution also fails to satisfactorily explain the philosophical silence with respect to KH, since no such relation has been established, and because the establishment of a reduction relation (or priority relation in general) rarely has the effect of eliminating interest in the phenomena that has been reduced.

Finally, in the last section, I propose that while there is no single solution to the puzzle, there are a number of plausible reasons as to why philosophers have paid relatively little attention to KH. One explanation invokes something like Ryle’s response to this puzzle, which is to say that philosophers have paid relatively little attention to KH because of lingering Cartesian presuppositions about minds and their relation to bodies. Daniel Dennett has also argued that such lingering presuppositions exist (though not necessarily in the same epistemological context) and has even come up with the label “Cartesian Materialism” to describe them.\(^9\)

However, I also believe that considerations such as those raised by Richard Rorty in his book *Philosophy and the Mirror of Nature*\(^10\) and Ian Hacking in his book *Representing and Intervening*\(^11\) can be invoked to formulate an additional (and perhaps complementary) solution to the puzzle. Rorty and Hacking both suggest that historically philosophers have conceived of knowledge in terms of representations, and have seen the goal or function of knowledge as to

provide a mapping or mirroring of reality. If this is the case, then it should not surprise us that KH has been mostly ignored. After all, while KT might be plausibly described as representational, that adjective is less plausibly applied to KH. Knowing how to ride a bicycle does not, on the face of it, seem to be primarily about having a certain representation of how the world is; rather it seems to be about acting on the world – i.e. being able to do something with a bicycle.  

These solutions can both help to explain the relative silence of philosophers on the subject of KH, and also to explain the general approach that philosophers have taken to KH when they have taken up the subject. That is, philosophers (in those cases in which KH has been considered) have tended to focus on kinds of KH that are closely related to representational aspects of the mind, such as knowing how to speak a language or knowing how to apply concepts, while paying less attention to non-representational sorts of KH – for example, those involving kinesthetic information or motor abilities, such as knowing how to juggle or ride a bicycle. Additionally, these solutions can help point the way to a more effective approach to the study of KH – an approach that goes beyond the focus on the representational aspects of KH and surveys and integrates the work done by scientists and empirical researchers who have considered this topic. I begin to develop this alternative approach in succeeding chapters.

A final introductory note: the puzzle that I am pointing to in this chapter is part sociological and part philosophical. The sociological aspect of the puzzle stems from the fact that I am raising questions about the behavior of a group of people – i.e. I am asking why philosophers have behaved in a specific way towards a specific topic. The philosophical aspect of the puzzle relates to finding a solution(s) to the puzzle. Ultimately, I will argue, philosophers

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12 Though of course having such an ability might generally include having representations of various kinds.
13 And the number of scientists and empirical researchers who have written on the subject of KH is surprisingly large. See the references in the above Introduction (section I.2) for sources.
have behaved in the way that they have towards this topic because of the philosophical views that they have held and/or assumptions they have made. Identifying those philosophical views and assumptions can be a valuable means of moving the philosophical discussion forward.

1.2 The Puzzle

The question of why philosophers have had so little to say about knowledge-how (KH) can best be examined if it is first made explicit. Consider the following argument:

(P1) Philosophers are interested in the study of (all kinds of) knowledge.¹⁴
(P2) KH is (a kind of) knowledge.

(C) Therefore, philosophers are interested in the study of KH.

The puzzle arises from the fact that the argument seems to be valid, both premises seem to be true, and yet the conclusion seems false. The puzzle can, alternatively, be posed in conditional terms: if philosophers (especially epistemologists) are interested in knowledge (of all kinds), and if KH is a kind of knowledge, then why haven’t philosophers (and epistemologists) shown much interest in KH?

Once the puzzle is made explicit, the range of possible solutions becomes clear. Logically, one could avoid problems by denying one or both of the premises, or else by denying that the premises, though true, lead necessarily to the conclusion. Additionally, one could dissolve the puzzle by arguing that the conclusion is not really false after all and that philosophers have, in fact, taken an interest in KH. In the next section, I will show that this latter solution is not plausible by demonstrating that philosophers have shown very little interest in KH. I will take up the former possibilities in the subsequent section.

1.3 Showing that the Conclusion is False

¹⁴ The word “kinds” here should be understood as referring to substantive, or general, categories of knowledge (sometimes referred to as “ways of knowing”). Obviously, philosophers are not interested in all kinds of knowledge considered in a more narrow or specific sense, such as knowledge of North American deciduous trees, or knowledge of ancient Roman coins.
As noted above, I want to first convince you that the above conclusion (i.e. that philosophers are interested in KH) is, in fact, false. That is, I want to demonstrate that neither epistemologists nor philosophers in general have shown much interest in KH, especially when compared to KT. \(^{15}\) Once that has been established, explanations will be considered.

### 1.3.1 Philosophy Reference Works

Philosophical reference works are meant to serve as both useful introductions to, and authoritative summaries of, a wide variety of philosophical topics of both contemporary and historical interest. For example, Robert Audi, editor of the *Cambridge Dictionary of Philosophy*, writes that the purpose of that book is to respond to “the need for a comprehensive, multi-author philosophical reference work that is at once enormously wide in scope, intermediate in size, and authoritative in content”; and, indeed, the book “covers more than 4,000 concepts and philosophers.” \(^{16}\) Yet, the dictionary has no entry for ‘knowledge-how’. Its entry for ‘epistemology’, which is four-and-a-half pages long, does note briefly that “(p)hilosophers have identified various species of knowledge” (including knowledge-how) and that “controversy has arisen over distinctions between such species”, but it does not elaborate on the controversy, and is mostly concerned with issues related to KT. \(^{17}\)

Similarly, in the *Oxford Companion to Philosophy*, there is no entry for ‘knowledge-how’ (or its cognates) and the entry for ‘knowledge’ does not mention KH. \(^{18}\) Also, there is no reference to KH in *Oxford’s* entries for ‘epistemology, history of’ or ‘epistemology, problems

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\(^{15}\) Until very recently, that is (as noted in the above introduction). In the last few years, there has been a burst of interest in the subject, and an explosion of articles and books on KH and its relation to KT. The claims below should be understood to refer to the period prior to this recent revival, which occurred as this dissertation was being written.

\(^{16}\) Audi, Robert (1999), p. xxvii.

\(^{17}\) Ibid, p. 273.

\(^{18}\) Honderich (1995), 447-448. It is suggestive that the *Oxford Companion* does include an entry for the rather obscure concept of ‘knowledge by presence’ – defined as a “technical term…used in Islamic philosophy…”, p. 448.
of’.

The term ‘knowledge’, here, as in many contemporary discussions of epistemology, is almost always used to refer solely to ‘propositional knowledge’, or KT.

In *The Blackwell Companion to Philosophy*, which has a 23-page section on epistemology, KH is mentioned briefly in the introductory section: “One can know how to do something, in the sense of having an ability or skill. That is what is meant when one says, ‘I know how to play chess’.” A few sentences later, it is conceded that “propositional knowledge” is “the kind epistemologists most wish to understand.”

No explanation is offered as to why that should be the case.

The topics most often and most thoroughly covered by these reference works in their entries on knowledge and epistemology are topics which tend to relate either solely or most significantly to KT. *The Blackwell Companion*, for example, discusses topics such as the justified, true belief (JTB) account of (propositional) knowledge (and associated Gettier-type problems), skepticism, theories of justification (e.g. internalism, externalism, foundationalism, coherence, etc.), and perception. Other topics that are discussed in such works include *a priori* and *a posteriori* knowledge, inductive and deductive methods of acquiring knowledge, and knowledge by acquaintance. And while it is true that some of these topics apply in principle to KH as well as to KT (e.g. something like the internalism/externalism debate arises with respect to KH, and skeptical problems can arise for this sort of knowledge as well), they are rarely ever actually applied to KH.

### 1.3.2 Epistemology Texts and Anthologies

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21 Ibid, p. 38.
22 For example, do Cartesian demons and brain-in-the-vat scenarios cast doubt on KH as well as KT? To know how to do something, do I have to know that I know how to do it? Could I accidentally know how to do something, thus introducing Gettier problem analogues? Etc. Some of these issues are discussed in Chapter 6, where I present my positive account of KH.
A look at some prominent epistemology texts and anthologies shows a similar silence with respect to KH. Robert Audi’s *Epistemology: A Contemporary Introduction*, for example, seems to be widely used in undergraduate epistemology courses. There is no index entry for ‘knowledge-how’ in the book, and no mention of KH or related terms in the text. Audi focuses on propositional knowledge and considers traditional questions such as those mentioned above: the JTB analysis of (propositional) knowledge, sources of (propositional) knowledge, problems of justification, skepticism, etc.

A 2002 anthology, *Epistemology: Contemporary Readings*, which (contrary to what the title suggests) includes selections from authors ranging from Plato to William Alston, is divided into sections on “sources of justification and knowledge”, the “structure and growth of justification and knowledge”, and the “nature and scope of justification and knowledge”. The book contains no articles on knowledge-how and no index entry for KH. Throughout, ‘knowledge’ seems to refer only to ‘propositional knowledge’.

*Epistemology: An Anthology*, edited by Ernest Sosa, Jaegwon Kim and Matthew McGrath, is divided into sections on topics such as skepticism, epistemic justification, contemporary foundationalism and coherentism, epistemic externalism, virtue epistemology and relativism. Knowledge-how is briefly discussed in one of the included articles (there are 43 in total) entitled “Epistemic Norms”, in which John Pollock distinguishes between ‘procedural

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23 Audi (2003). My claims about the book’s popularity (as well as the other books discussed) are based on informal polls of colleagues, Amazon rankings, philosophy courses listed on the web (and/or syllabi posted), and other informal sources.


knowledge’ (i.e. KH) and ‘declarative knowledge’ (i.e. KT). The distinction is raised, however, in a discussion of traditional epistemic problems related to KT. There is no independent consideration of the nature of KH or its relation to KT.

In *Knowledge: Readings in Contemporary Epistemology*, editors Steven Bernecker and Fred Dretske divide the subject matter into topics including the JTB account of knowledge; externalism and internalism; skepticism; and sources of knowledge. None of the included articles has KH as its central topic and, again, the focus is on epistemological problems related to KT.

These examples, in my experience, are representative of the kinds of topics and concerns that dominate modern epistemology books. And, again, while it is true that some of these concerns – such as justification – could be explored in relation to KH as well as to KT, such exploration rarely ever actually occurs. While some of these sources sometimes recognize that KT is not the only kind of knowledge, such admissions are usually brief, and made only in passing. And *none* of the books or anthologies consulted contained sections or articles devoted specifically to consideration of the nature of KH and/or its relation to KT.

### 1.3.3 Philosophy Journals

To find discussion of KH, then, one must consult philosophical journals. But even here, the record is spotty. Recall that Ryle initiated the modern discussion of this topic; his paper

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27 Ibid. Pollock writes, “What makes it possible for your bike-riding behavior to be governed by norms without your thinking about the norms is that you *know how* to ride a bicycle. This is *procedural knowledge* rather than declarative knowledge…” , p. 195 (emphases in the original).

28 Bernecker and Dretske (2000). This anthology contains only an Index of Names (not subjects). The entries for Ryle refer to discussions of Ryle’s theory of mind and memory and do not mention the KH/KT distinction.

29 Other books considered include: Dancy and Sosa (1994), Williams (2001), Feldman (2002), and Pollock and Cruz (1999).

30 In this section, I merely list (and sometimes briefly summarize) the journal articles on KH. Further consideration, where relevant, follows in later chapters.
“Knowing How and Knowing That” was presented as the Presidential Address to the Aristotelian Society in 1946 and his book *The Concept of Mind* was published in 1949. The paper seems to have made barely a ripple; and while the book, of course, caused quite a splash, journal reviews tended not to focus on its arguments with respect to KH and KT. Those who did take note of Ryle’s discussion of this topic generally praised it, but it was just as often ignored.

A bit of in-depth discussion of Ryle’s treatment of KH and KT finally occurred in the journal *Analysis* in the early- to mid-1950s. This included a 10-page article by Ernest Gellner about KH and validity, and a back-and-forth between John Hartland-Swann and Robert Ammerman about whether or not Ryle’s views committed him (Ryle) to the claim that KT is reducible to KH. The entire debate consisted of three articles and totaled 11 pages.

Jane Roland published an article on KH and KT in *Philosophical Review* in 1958, David Carr published two articles on KH in the late 70s and early 80s – in *Mind* and *American Philosophical Quarterly*, respectively – and R.L. Franklin discussed KH in his “Knowledge, Belief and Understanding” in *Philosophical Quarterly* in 1981. Two decades of (mostly) silence followed, with a few exceptions. In 2001, however, Jason Stanley and Timothy Williamson revived the topic with their article, “Knowing How”, which argued (contra Ryle)

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31 Ryle (1946).
32 Ryle (1949).
33 Ryle’s critique of dualism and embrace of philosophical behaviorism garnered much more attention.
34 Praisers included: Hampshire (1950), and MacDonald (1951). Ignorers included: Hofstadter (1951), and Campbell (1953).
35 Gellner (1951), pp. 25-34.
36 Hartland-Swann (1956), Ammerman (1957), and Hartland-Swann (1957).
37 Roland (1958).
38 Carr (1979) and Carr (1981).
40 For example, Dalmiya and Alcoff (1993) and Katzoff (1984).
that KH is a species of KT.\textsuperscript{41} A flurry of articles have appeared since then many of which focus on the particulars of Stanley and Williamson’s arguments.\textsuperscript{42}

These are not the only articles that touch upon the topic of KH, but they constitute the bulk of the pieces in prominent journals that focus on, or consider, KH as an independent topic (since Ryle). That amounts to approximately 15 articles (plus or minus) in 60 years! Consider, by comparison, the number of articles on such topics of Gettier problems with the JTB account of propositional knowledge (approximately 200), \textit{a priori} knowledge (about 175), and knowledge by acquaintance (about 45).\textsuperscript{43} So, while philosophical journals have not completely ignored the topic of KH, overall, they still reflect the fact that philosophers have devoted a very small amount of attention to the subject.

\subsection*{1.3.4 Ryle’s ‘Widely Accepted’ Distinction?}

While the above summary of philosophical attention paid to KH is not meant to be exhaustive, it should give a sense of how little consideration has been given to the topic. Some might argue, though, that this neglect is not so widespread as I have represented it to be, and that KH is, in fact, discussed in a number of places that I have failed to mention. In the opening paragraphs of Stanley and Williamson’s article, “Knowing How”, for example, the authors claim that Ryle’s distinction between KH and KT is “widely accepted” and mention a number of

\textsuperscript{41} Stanley and Williamson (2001).

\textsuperscript{42} Including Koethe (2002), Schiffer (2002), Rumfitt (2003), Snowdon (2003), Noë (2005), Rosefeldt (2004), and Cath (2009). One exception is Hawley (2003), which is not directly related to the concerns about KH and KT raised by Stanley and Williamson’s 2001 article. Some other such examples appear in Bengson and Moffett (2011). Many important and interesting articles on KH were being published as I was finishing the present work, and unfortunately could not be incorporated.

\textsuperscript{43} Numbers are based on database searches of \textit{The Philosophers Index} (1940-2006 – after the Stanley and Williamson paper had started to attract attention, but before the more recent explosion of philosophical work on the subject). A search for articles on ‘knowledge-how’ and ‘knowing-how’ results in approximately 30 hits, a number of which only mention KH without any discussion or analysis. Such results are admittedly crude measures of the amount of philosophical attention to a subject (as the results of the ‘KH’ searches show), but can (when supplemented with other considerations, such as those above) give a preliminary indication of philosophical interest.
prominent philosophers who rely upon the distinction and apply it to a variety of philosophical problems and domains. They point out that:

Hilary Putnam characterizes the central moral of his work on meaning and understanding in the following terms: “knowing the meaning of the word ‘gold’ or of the word ‘elm’ is not a matter of knowing that at all, but a matter of knowing how.”

And that:

…according to David Lewis, knowing what an experience is like amounts to being able to remember, imagine, and recognize the experience. Possession of such abilities, Lewis writes, “isn’t knowing that. It’s knowing how”.

And also that:

…in the philosophy of language, semantic competence is, according to Michael Devitt, “an ability or a skill: a piece of knowledge-how not knowledge-that.

Why, then, the insistence that KH is such a widely neglected topic in the face of all this attention?

It is because despite their invocation and employment of KH, the above philosophers do not actually discuss KH itself (i.e. its nature, properties, relation to KT, etc.). Nor do they defend the assumption (which they seem to be making) that KT and KH are fundamentally different kinds of knowledge. As Stanley and Williamson point out, despite the widespread acceptance (and use) of Ryle’s conclusion that KH is distinct from KT, “arguments for it are rarely presented”. And, referring to the first quote above, they write, “we are unaware of any passage in which Putnam argues for the distinction [between KT and KH]”.

Similar points are made about the other philosophers mentioned as well. So rather than undermining the claim that KH has been insufficiently considered by philosophers, such examples actually deepen the
aforementioned mystery. For if these philosophers hold positions which depend upon there being a KT/KH distinction (which seems to be the case), then why do they show so little interest in making or defending arguments to that effect?

1.4 Attempting to Explain the Silence

How, then, to explain the silence of philosophers with respect to KH? Ryle claims, in the quote cited at the beginning of this chapter, that:

> In their theories of knowledge (philosophers) concentrate on the discovery of truths or facts, and they either ignore the discovery of ways and methods of doing things or else they try to reduce it to the discovery of facts (my italics).

Ryle’s suggestion, then, is that philosophers (at least those who have not explicitly ignored the topic) have been silent about KH because they have believed that KH is reducible to KT. This suggestion seems plausible, since in the scant literature that exists on KH, there has been debate about whether or not one kind of knowledge reduces to the other. I will argue below that this is not a satisfactory solution to this puzzle, but before taking it up for consideration it will be helpful to clear out a bit of logical space by eliminating some possible alternative explanations mentioned above (towards the end of section I.1).

1.4.1 Challenging the Argument

Some might attempt to solve this puzzle of KH (as I have laid it out above) by challenging one of the premises in the argument above, used to illustrate the puzzle. Recall that (P1) in that argument is the claim that epistemologists are interested in the study of (all kinds of) knowledge, and (P2) is the claim that KH is a kind of knowledge. Both seem prima facie plausible – in fact (P2) sounds downright tautologous – but upon closer consideration, both are open to possible challenges.

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49 For example, see the debate between Hartland-Swann and Ammerman, cited in footnote 35 above. Other priority relations between KT and KH are sometimes suggested as well. See discussion below (Section 1.4.2).
For example, one might challenge (P1) by arguing that:

(i) epistemologists are not interested in all kinds of knowledge – only (or mainly) propositional knowledge (KT).

This view is suggested by the above quote from the Blackwell Companion reference book, in which appeared the claim that “propositional knowledge” is “the kind epistemologists most wish to understand.”50 Additionally, one might challenge (P1) by claiming that:

(ii) philosophers are primarily interested in the topic of truth, and so have only derivative concerns about knowledge – concerns which lead to a focus on propositional knowledge, since propositions have truth values.51

Alternatively, one might challenge (P2) and argue that:

(iii) KH is not really a kind of knowledge at all, in which case epistemologists would understandably not take an interest in it.

A final possibility is that someone might challenge the claim that the conclusion (i.e. that philosophers are interested in the study of KH) is false and argue that philosophers have shown interest in KH. How so, given the evidence against such a claim provided above (section I.2)? Well, they might do so by claiming that:

(iv) KH is (straightforwardly) identical to KT, in which case epistemologists have not been ignoring it after all (since their studies of KT have simultaneously been studies of KH).52

The above list of possibilities (i – iv) covers much of the logical ground, and – as has already been established – there is not much literature on KH to comb through in order to discover whether any of the above possibilities might explain why KH has been so little discussed. Such a search, however, reveals that there are no philosophers who seem to explicitly accept or defend any of the above positions (i) – (iv).

51 A possibility derived from Ryle’s suggestion, quoted above, that “(i)n their theories of knowledge [philosophers] concentrate on the discovery of truths or facts…” , Ryle (1946), p. 225.
52 See footnote 8 above.
Of course, lack of explicit advocacy does not conclusively rule any of the above possibilities out. And options (i) – (iv) can, of course, be considered on their own, though in the absence of actual advocates with actual arguments, it is difficult to know how to do them justice. Is it possible, for example, that many philosophers accept (i) and believe that epistemology is about the study of just one kind of knowledge? Despite the actual historical focus on KT, such a view is never explicitly supported. Philosophical reference works and texts, such as those referred to above,\(^53\) define epistemology pretty straightforwardly as the study of knowledge in general. That implies a commitment to the study of all kinds of knowledge (or ways of knowing). *The Cambridge Dictionary of Philosophy*, for example, defines epistemology as

…the study of the nature of knowledge and justification; specifically, the study of (a) the defining features, (b) the substantive conditions or sources, and (c) the limits of knowledge and justification.\(^54\)

And, according to *The Oxford Companion to Philosophy*, epistemology is the “theory of knowledge” and is “that branch of philosophy concerned with the nature of knowledge, its possibility, scope and general basis.”\(^55\) Even the *Blackwell Companion to Philosophy* – which conceded (as noted above) that “propositional knowledge” is “the kind epistemologists most wish to understand”\(^56\) – does not make the stronger claim that epistemologists are (or should be) *only* committed to the study of KT (or that KT is the only kind of knowledge).

None of the resources listed above (or any other that I could find) defines or characterizes epistemology as the study of only one kind of knowledge. Nor do such resources even mention this position as an alternative conception of the nature of epistemology. So if this is a position that is actually held by some philosophers, it is apparently not a commonly held view and it is

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\(^{53}\) See section 1.3 above.

\(^{54}\) Audi (1999), p. 273.


\(^{56}\) Bunnin and Tsui-James (2003), pp. 37-60.
definitely not philosophical orthodoxy. This implies that such a position would be controversial and would therefore require explanation and justification – neither of which has been forthcoming. So it seems rather unlikely that the reason that philosophers and epistemologists have been silent about KH is because they believe that epistemology is (or should be) only committed to the study of propositional knowledge.\footnote{Whether or not such a position is tenable is a separate question. Right now I’m only concerned with the question of whether the acceptance of such a position could explain the philosophical silence with respect to KH.}

Similar considerations could be raised with respect to options (ii) – (iv). While of course it is true that philosophers are very much interested in the concept of truth, the claim that this is the sole or primary focus of epistemology (as is implied by (ii)) does not appear to be explicitly advocated by anyone, or recognized as a competing, alternative point of view. This puts the burden of proof on someone holding such a view to explain and/or justify it. Again, such explanations and justifications are nowhere to be found. Similar points can be made with respect to the claim that KH is not a kind of knowledge at all (as in (iii))\footnote{A few of the reference sources cited above, in fact, mention KH as a kind of knowledge (though, as noted, they do not say much more about it than that). It is also telling that the prominent philosophers mentioned above – Putnam, Lewis and Devitt – all refer, without hesitation, to KH as a distinct kind of knowledge. Presumably, if any of (i - iv) were true, that would raise difficulties which none of those authors pause to consider.}, and the claim that KH and KT are straightforwardly identical (as in (iv)).

In summary, while (i) – (iv) represent possible explanations as to why philosophers and epistemologists have historically focused almost exclusively on KT, none of them seems to represent an actual reason for their doing so. All four positions represent a divergence from philosophical orthodoxy – which means, presumably, that if philosophers held any of those views, they would do so explicitly, and would feel the need to provide a defense of their position.\footnote{Below, I consider the possibility that unconscious or implicit beliefs might explain why philosophers tend to focus on KT rather than KH.} No such defenses have come to light. While such considerations do not conclusively
demonstrate that (i) – (iv) are false, they do seem sufficient to rule out these explanations as reasons why KH has been so widely ignored. The puzzle remains.

1.4.2 The Priority of KT?

Having eliminated a number of possible solutions to the puzzle, let us return to the suggestion, mentioned above in association with Ryle, that philosophers tend to privilege KT in their discussions of knowledge because of a belief that KT has a more fundamental or basic status than KH, and that it should therefore take priority. This is sometimes put in terms of the reduction relation – that is, the possibility that KH reduces to KT is often discussed among philosophers. Recall, for example, Ryle’s assertion that:

In their theories of knowledge (philosophers) concentrate on the discovery of truths or facts, and they either ignore the discovery of ways and methods of doing things or else they try to reduce it to the discovery of facts (my italics). 60

However, the reduction relation is not the only priority relation that is posited to exist between KH and KT. For example, Stanley and Williamson argue that KH is a species of KT. 61 Other priority relations that have been suggested to exist between KT and KH include: “logically prior to”, “sub-category of”, “special case of”, “analyzed with reference to”, and “subsumed under”. 62 Perhaps some of these relations are merely intended as synonyms for ‘reduces to’, but others pick out relations other than reduction relations. 63 Nevertheless for the purposes of this section, these relations can be usefully lumped together for the following reason. Those who would propose invoking a priority relation to explain why KH has been ignored seem to be committed to the following two claims: (A) a generally acceptable priority relation between

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62 Ryle (1946).
63 Hartland-Swann (1957).
64 Ibid.
65 Carr (1979).
67 Stanley and Williamson, for example, argue that KH is a species of KT, but not necessarily that it reduces to KT.
KT and KH has been (or could easily be) established\(^{68}\); and (B) the establishment of such a priority relation explains and justifies (or would explain and justify) the epistemological focus on KT and the inattention to KH. However, as I will argue below, neither (A) nor (B) is a plausible claim. The claim (A) is implausible because no generally accepted priority relation between KT and KH has (yet) been established. If anything, the philosophical winds seem to be blowing the other way (toward the view that KT and KH are distinct kinds of knowledge).\(^{69}\) And the fact that no philosophical consensus has yet arisen on this matter, and that prominent philosophers have taken up positions on both sides of the debate, suggests that an easy solution to the problem is unlikely. And (B) is implausible because it is very rare that the establishment of any priority relation has the effect (or should have the effect) of eliminating interest in the phenomena shown to have lower priority.

In the rest of this section, I will elaborate on these points and thus try to show that reference to the ‘priority hypothesis’ – i.e. the view that KT is in some sense prior to KH – cannot adequately resolve this puzzle regarding KH. It is worth noting that Ryle emphatically disagreed with the claim that KH is reducible to KT, and also seemed to deny the more general priority hypothesis. In *The Concept of Mind*, for example, Ryle writes that, “‘(i)ntelligent’ cannot be defined in terms of ‘intellectual’ or ‘knowing how’ in terms of ‘knowing that’” (Ryle’s emphasis).\(^{70}\) And in his article “Knowing How and Knowing That”, Ryle challenged the view that “knowledge-how must be reducible to knowledge-that”\(^{71}\) and asserted that “knowledge-how

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\(^{68}\) I put this claim in terms of a *generally acceptable* priority relation having been established because if such a relation exists but has not yet been established, presumably philosophers would be interested in showing how it could be established, which would lead to more attention paid to KH rather than less. So it seems that only a belief that such a relation has already been established would sufficiently explain the philosophical silence with respect to KH.

\(^{69}\) As even Stanley and Williamson concede, though they are arguing for the existence of a priority relation.

\(^{70}\) Ryle (1949), p. 32.

\(^{71}\) Ryle (1949), p. 217.
cannot be built up by accumulation of pieces of knowledge-that”

According to Ryle, this mistaken view (that KH is reducible to KT) stems from the acceptance of a false (Cartesian, inner-theater) theory of mind; and, once such a theory of mind is properly rejected, and a more suitable theory of mind is embraced, the situation with respect to KT and KH will likely right itself.

Since few contemporary philosophers accept the Cartesian theory of mind, it might be tempting to reject Ryle’s conclusions about the priority hypothesis as well. But such a move would be premature. After all, perhaps it is the case that there are independent reasons for accepting the priority hypothesis – that is, there might be reasons for believing it is true even if one rejects the Cartesian inner-theater view of mind. So, even if Ryle is incorrect about why philosophers have accepted the priority hypothesis, we might still ask whether he was correct in claiming that it is acceptance of the priority hypothesis that leads philosophers to focus on KT (and pay little attention to KH). And again, this really breaks down into two questions: (a) have philosophers, generally speaking, accepted the priority hypothesis?; and (b) if true, does the priority hypothesis resolve the puzzle of KH? I will argue that the answer to both questions is “no”, and thus that the priority hypothesis fails to solve the puzzle of KH.

1.4.3 No Consensus

Those who attempt to explain the puzzle of KH by reference to a priority relation of some sort imply that that a general consensus exists among philosophers and epistemologists that a priority relation between KH and KT has been established (or could easily be established). This general consensus is supposed to explain the focus on KT and the general silence with respect to KH. But no such consensus exists, and no such priority relation has been conclusively established. Again, while it is true that some philosophers have defended the priority

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hypothesis, it is by no means uncontroversial. Stanley and Williamson, who are recent defenders of such a view, admit as much. In fact, they see themselves as opposing the “widely accepted” view (which they attribute to Ryle) that KH and KT are distinct kinds of knowledge; and to back up this claim about ‘wide acceptance’, they cite prominent philosophers such as Lewis, Putnam and Devitt, who seem to have assumed that the distinction between KH and KT is legitimate, and that no such priority relation exists.

And the controversy surrounding this claim about priority is not recent. A number of the earliest commentaries on Ryle’s discussions of KH and KT praised his arguments against the view that KH reduces to KT, and others focused on the question of whether or not Ryle was committed to the view that the reduction goes the other way around – that is, some thought Ryle was (rightly) committed to the view that KT reduces to KH (rather than the other way around)! It seems, then, that there are at least three possible positions that might be held with respect to the relation between KH and KT:

1) KT is prior to KH
2) KH is prior to KT
3) KT and KH are distinct kinds of knowledge (no priority relation exists)

All three have been held (or were thought to have been held) at various times by prominent philosophers, and none of the three positions has achieved the status of the consensus position. So, this view – that philosophers focus on KT because, generally speaking, they have accepted the priority hypothesis – fails to explain the silence surrounding KH since it presumes a consensus that has never existed. And not only does it fail to explain the silence, but also it

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73 It is surprisingly difficult to find a philosopher that straightforwardly defends the claim that KH reduces to KT, despite Ryle’s claim that this was philosophical orthodoxy when he wrote on the subject. Priority relations besides reduction have been specifically advocated – for example, by Stanley and Williamson.
74 Cf. section I.3.4 above.
75 Since their claims all depend on the absence of such a relation. The debate that Stanley and Williamson’s article has kicked up is evidence that this is far from a settled question.
76 Hartland-Swann (1956) and (1957).
again deepens the mystery – since the fact that no such consensus about priority has ever been reached implies that the relation between KH and KT remains an open question. And open questions, by nature, tend to attract more attention than settled issues.

1.4.4 What If the Priority Hypothesis Were True?

The absence of a consensus with respect to the KT/KH relation is not even the worst of the problems for this proposed solution to the puzzle of KH. A more fundamental difficulty stems from the fact that even if the priority hypothesis were true (and generally accepted), it would still not necessarily explain the relative silence of philosophers on the subject of KH. To see why, consider the following question: why should the fact (if it is a fact) that KH reduces to KT result in the philosophic focus on KT over KH? The most obvious answer seems to stem from a general feature of priority relations; namely, that once a priority relation is established, it is only natural to focus attention on the phenomenon which has been shown to be more fundamental, and shift attention away from the phenomenon that has been ‘reduced’ (or shown to be non-basic). Once it was determined that lightning was a form of electricity, for example, rather than an irreducible and basic phenomenon itself, the amount of scientific attention paid to lightning likely waned.

The problem with this answer, however is that it mischaracterizes what tends to happen once a priority relation has been established. More specifically, the establishment of a priority relation rarely (if ever) has the effect of eliminating interest in that which has been shown to be less fundamental. While it is possible, for example, that a reduction might be “eliminative” – that is, it might result in the elimination of some phenomena from our ontology, or vocabulary (and thereby eliminate philosophical interest in that phenomena) – this is not a general feature of the establishment of priority relations. As Jason Schwartz put it in a 1991 article, “Reduction,
Elimination and the Mental”: “The threat of eliminativism proceeding from reduction is an idle bugaboo.” There are, Schwartz notes, some examples of ‘eliminative’ reductions, but “whether a particular case inclines us to elimination depends on the details”. And if the establishment of a priority relation is not eliminative, then there is generally no good reason for interest in the phenomena that has been shown to be less basic to be minimized (or to disappear).

Schwartz’ quote above suggests examining the details of particular reductions to determine whether or not they are eliminative. We could do so in the case of KH and KT; however in this case, as discussed above, no generally accepted priority relation has been established. Yet, there is a candidate that we might consider – namely the account of reduction that Ryle considers and rejects in *The Concept of Mind* (and other writings). I will compare this account to other accounts of the same type and attempt to demonstrate that first, it is not an eliminative reduction, and second, that it is not the kind of reduction that would (or should) lead to diminished interest in KH. These conclusions, I suggest, generalize to other possible priority relations that might be hypothesized to exist between KH and KT.

### 1.4.5 A Possible Reduction of KH to KT

Ryle suggests that those who believe that KH reduces to KT often have the following account in mind. Consider a piece of KH, such as knowing how to ride a bicycle. What this piece of KH amounts to, on this reductive account, is a collection of pieces of KT – e.g. knowing that one must put one’s feet on the pedals and apply pressure, knowing that one must keep one’s balance, knowing that one must steer appropriately, etc. Once one has that collection of pieces

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78 The difficulty in finding an example of someone who explicitly puts forward or defends this – or any other – reduction relation between KH and KT suggests that the priority hypothesis was either not as widespread as Ryle claimed or else that it was accepted implicitly and not directly argued for. For more on the latter possibility, see Section 1.5 below.
79 In Chapter 5 of the dissertation, I will explicitly consider Stanley and Williams’ argument that KH is a species of KT. But I do not take it up here since they themselves concede that the relation they are proposing is not a reduction and not eliminative.
of KT, one must simply apply it in a particular situation and thereby perform the action. So on this reductive view, KH is something like applied KT, and thus ascribing knowledge-how to someone (e.g. ‘John knows how to ride a bicycle’) is, in effect, ascribing knowledge of various propositions to him as well as the ability to apply that propositional knowledge to an actual bicycle. Ryle describes this view of KH as applied KT as follows:

…the agent must first go through the internal process of avowing to himself certain propositions about what is to be done (‘maxims’, ‘imperatives’ or ‘regulative propositions’ as they are sometimes called); only then can he execute his performance in accordance with those dictates…To do something thinking what one is doing is, according to this legend, always to do two things; namely, to consider certain appropriate propositions, or prescriptions, and to put into practice what these propositions or prescriptions enjoin. It is to do a bit of theory and then to do a bit of practice.

Another analogy used to illustrate this reductive account is the example of a recipe. Knowing how to make a cake, on this view, reduces to knowing that step one of the recipe is such-and-such, knowing that step two is such-and-such, etc. Once one knows the propositions that make up the recipe, one knows how to make a cake.

The question at hand, then, is whether or not this account of the reduction of KH to KT is eliminative. That is, if we accept this account, does it, in effect, eliminate KH as a subject of interest? If it does, then perhaps this can help to explain why philosophers have focused on KT and have had little to say, explicitly, about KH. Now, it should first be pointed out that there are generally two ways in which phenomena might be said to be reduced to other phenomena: (a)
linguistically, and (b) metaphysically (or ontologically). I will briefly describe each type of reduction and argue that the above attempt to reduce KH to KT (hereafter referred to as KH-reduction) succeeds at neither.

One kind of reduction that might be said to eliminate some phenomena is closely related to language and linguistic practices. In this kind of reduction, it is proposed that ‘talk of’ some phenomenon can be reduced to, or restated in, ‘talk of’ some other phenomena. For example, in the “early days of analytic philosophy” it was thought that “(talk of) physical objects was supposed to be reduced to (talk of) sense-data by explicit definitions or other forms of conceptual analysis.” Similarly, behaviorists of a certain sort thought that all talk of mental states could be reduced to talk of behaviors and dispositions to behave. This kind of reduction is often posited to explain the reference to objects or phenomena that theories tell us are unknowable – perhaps because they do not exist, or are not available to the senses, etc. So, sense-data theories needs to explain what people are actually referring to when they talk about stuff ‘out there’ in the world (since we have no direct access to that world); and the behaviorist needs to explain what people are referring to when they refer to mental states such as beliefs and desires, since such things do not exist, according to behaviorism. So reduction, in this sense, is used to explain how talk of such phenomena can still be meaningful.

This type of reduction, if successful, could conceivably be eliminative. If behaviorism had been a genuinely successful theory, and had become widely accepted, then we might expect that little interest in mental states would have remained. Similarly, if sense-data theorists had won out, philosophers might not be spending much time talking about the nature of the

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83 There are other sorts of reductions – for example, the reduction of one theoretical domain to another (e.g. the claim that chemistry reduces to physics). However, I have ignored those sorts of reductions that do not apply to the subject at hand.

84 Audi (1999), p. 778 (under “reduction”).
inaccessible ‘objects out there’. However, not only were these attempted reductions unsuccessful, it is difficult to think of a reduction of this type that has met with success. And furthermore, even if successful reductions of this sort do exist, it is unlikely that those who believe that KH-reduction (as described above) have this sort of reduction in mind. On the above account of KH-reduction, there is no suggestion that KH does not really exist, and the reduction is not merely attempting to explain how talk of KH can be meaningful. Rather, it is an attempt to explain KH in terms of KT. So this model of reduction seems unlikely to apply to the debate about KH and KT.

The other kind of reduction is metaphysical, or ontological, reduction. With this type of reduction, certain objects, properties or other phenomena within a particular domain are said to reduce to something more basic. Examples of this sort of reduction include the view that minds reduce to bodies (or brains), that water reduces to H2O, and that lightning reduces to electricity. In addition, claims that secondary qualities (such as color and heat) reduce to primary qualities (such as mass, motion, etc.) seem to be of this type as well. Note that this sort of reduction is meant to suggest a reduction of the phenomena themselves, as opposed to simply explaining talk about those phenomena.  

This type of reduction seems the most likely candidate for what KH-reductionists intend. That is, the KH-reductionist is not merely making a claim about language, or ‘talk of’ KH and KT. Rather, the KH-reductionist seems to be claiming that one specific phenomenon, KH, can be reduced to another, KT. So, it should be asked whether or not this type of reduction tends to have the effect of eliminating interest in that which has been ‘reduced’. And again, the answer

85 This is to contrast this type of reduction with the first type, discussed above. A behaviorist, for example, does not believe that mental states themselves exist and are reducible to behaviors (and dispositions to behave). So the behaviorist is not reducing one phenomena to another, but rather is attempting to explain what we mean when we refer to things that (according to behaviorism) do not exist. This contrasts with materialists about minds, who do not deny that minds exist, but who do believe that they can be explained in terms of brains.
seems to be that it does not. Minds, water, lightning, color and heat are phenomena that still attract attention, even from those who believe that such phenomena are ultimately reducible to more basic phenomena. Interest tends to remain in these ‘reduced’ phenomena for a number of possible reasons:

(a) If the reduction is proposed, but remains controversial (as in the case of the reduction of minds to brains), then interest is generated by those who wish to confirm or deny the proposed reduction. Consider, for example, the controversy generated by recent claims about the irreducibility of consciousness by philosophers such as Chalmers, as well as the related claims about the irreducibility of qualia. Such claims have generated immense interest by those on both sides of the debate, and this interest gets focused on both minds and brains, since one needs to consider both in order to understand any relation that might exist between them. This point, of course, applies generally to reduction claims (and more generally, priority claims) of any type that have not been conclusively established.

(b) Even when a reduction of this sort has been solidly established, and has thus become widely accepted and (relatively) uncontroversial – as in the cases of water, lightning, and secondary qualities – questions often remain and investigation into the nature of such reductions generally continues. For example, even after such a reduction is established, philosophers might consider the question of whether or not the reduction is necessary or contingent. On this point, consider the volumes of discussion generated by Kripke’s and Putnam’s claims with respect to water, Twin Earth, H₂O and XYZ. Additionally, the reduction of water to H₂O (for example) raises questions about the emergence of certain properties that water has but which individual

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86 Chalmers (1996). See, for example, the introduction, where Chalmers claims that a “reductive explanation of consciousness is impossible” (p. xiv).
87 See, for example, Jackson (1982).
88 See: Putnam (1975) and Kripke (1980).
H$_2$O molecules lack (such as liquidity) – which consequently raises philosophical questions about the phenomenon of emergence in general. Similarly, while scientists are confident that lightning is indeed an electrical phenomenon, they still actively study questions such as how exactly lightning is generated as well as how it relates to other electrical phenomena.\textsuperscript{89}

In short, then, reduction (whether merely posited, or successfully established) does not, in general, have the effect that the priority hypothesis suggests – namely, the effect of eliminating interest in the phenomenon that has been reduced. Similar points could be made with respect to other priority relations as well. For example, the proposal that ‘X is a species of Y’ will, if controversial, tend to generate interest in both Xs and Ys. And even if such a claim becomes well-established, it need not (and often will not) preclude interest in both Xs and Ys. Consider, for example, the claim that light is a species of electromagnetic radiation, or that bats are a species of mammal. Interest in light and/or bats has not disappeared since the establishment of such relationships.\textsuperscript{90}

In conclusion, there is now no philosophical consensus with respect to the relation between KH and KT; and even if there were, the result would not likely be what we see with respect to the philosophical attention paid to KH and KT. Therefore, the priority hypothesis fails to explain why KT is the focus of epistemological attention and why KH has faced a corresponding lack of attention. The mystery remains.

1.5 Remaining Possibilities

\textsuperscript{89} See, for example: \url{http://www.pbs.org/wgbh/nova/sciencenow/3214/02-works.html} where physicist Joe Dwyer writes that: “…despite decades of research we still don’t understand what is happening inside of clouds to start the common lightning bolt.”

\textsuperscript{90} In Stanley and Williamson (2001) they argue that KH is a species of KT but not that KH reduces to KT. Two relevant points about their account: (a) it has not been widely accepted, and in fact is quite controversial (see footnote 41 above for a list of some challenges to their account); and (b) it is unlikely to eliminate interest in KH since it invokes an original and provocative notion, “practical modes of presentation”, which should draw (and has drawn) attention to KH rather than diminish it.
In considering the explanations discussed above, I have been assuming that there is some conscious, rational reason(s) that explains why philosophers have focused almost all of their attention on KT and shown little interest in KH. But none of the reasons so far considered seems like a very plausible explanation for this state of affairs. There are, however, other possible explanations. After all, sometimes we ignore or avoid things not because we consciously and deliberately choose to do so for explicit reasons, but rather because of reasons that are outside of our conscious and deliberative processes. So, for example, it might be the case that philosophers and epistemologists have an unconscious blind spot for KH that is a result of the conceptual framework (or frameworks) that they hold. As Thomas Kuhn famously demonstrated, it is sometimes the case that questions, concepts and entities that are of primary interest to adherents of one scientific paradigm are ignored by, or seen as unimportant to, those under the sway of succeeding (or preceding) paradigms.\(^9\) The same might be true of philosophical (including epistemological) paradigms as well.

Perhaps, then, we can explain the lack of attention paid to KH via reference to such “unconscious” reasons. In what follows, I will suggest two such explanations that might resolve the puzzle of KH. The first I will call the *Cartesian Explanation* since it explains the puzzle of KH by reference to implicitly held Cartesian premises about minds. This solution is similar to, but not the same as, the solution that Ryle proposes. The second proposed solution, which I will call the *Rorty/Hacking Solution*, applies ideas put forward by Richard Rorty and Ian Hacking to the puzzle of KH – most importantly the idea that epistemologists have focused exclusively on

\(^9\) Kuhn (1962).
the idea of knowledge as representational while ignoring other functions that knowledge might serve.\(^92\)

1.5.1 The Cartesian Solution

Ryle points his finger at Cartesian philosophy of mind to explain the philosophical focus on KT. His claim is that people cling to an outdated, Cartesian theory of mind and that they thereby make ‘category mistakes’, such as the erroneous view that KH reduces to KT. However, Ryle does not seem to be suggesting that it is the unconscious acceptance of a Cartesian worldview that leads to the philosophical focus on KT over KH. Rather, he is suggesting that it is explicit (but bad) logical reasoning that leads to this state of affairs. That is, Ryle argues that the acceptance of Cartesianism (and its implications) is a logical mistake, not an unconscious oversight. In fact, the first section of *The Concept of Mind* is called “The Official Doctrine”, and in it Ryle writes:

There is a doctrine about the nature and place of minds which is so prevalent among theorists and even among laymen that it deserves to be described as the official theory. Most philosophers, psychologists and religious teachers subscribe, with minor reservations, to its main articles and, although they admit certain theoretical difficulties in it, they tend to assume that these can be overcome without serious modifications being made to the architecture of the theory…The official doctrine, which hails chiefly from Descartes, is something like this. With the doubtful exceptions of idiots and infants in arms every human being is both a body and a mind. His body and mind are ordinarily harnessed together, but after the death of the body his mind may continue to exist and function.

Human bodies are in space and are subject to the mechanical laws which govern all other bodies in space. Bodily processes and states can be inspected by external observers…

But minds are not in space, nor are their operations subject to mechanical laws. The workings of one mind are not witnessable by other observers; its career is private.\(^93\)

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\(^92\) I do not mean for these solutions to be exhaustive or exclusive. That is, there may well be other explanations as to why KH has been ignored by philosophers, and also these various explanations might combine in various ways and/or reinforce each other.

\(^93\) Ryle (1949), p. 11.
The problem with this explanation (which locates the source of this puzzle in an explicit acceptance of Cartesian philosophy) is that few philosophers today would count themselves as Cartesians. Descartes’ arguments with respect to minds, and mind-body dualism, have been thoroughly undermined, and while there are still philosophers around who are proponents of mind/body dualism, I suspect that they would not identify themselves as Cartesians. So any attempt to resolve the puzzle by reference to an explicit advocacy of Cartesian philosophy of mind seems deeply problematic.

So I believe that it is false that philosophers tend to ignore KH because they explicitly accept a Cartesian theory of mind. However, it might be the case that philosophers tend to ignore KH because they still tacitly accept some Cartesian premises about minds and bodies. A more plausible Cartesian Solution to the puzzle of KH, then, is that certain aspects of the Cartesian theory of mind have simply remained part of our worldview (perhaps a hardwired part of our worldview – see below), and so, in a Kuhnian sort of way, they unconsciously affect the way that we approach philosophical concerns related to minds and bodies – including epistemological concerns such as those related to KH and KT.

So, exactly which aspects of Cartesian philosophy are we unconsciously committed to? And how does it explain the puzzle of KH? Well, even after one has consciously shed Cartesian dualism (the conception of a person as composed of an immaterial mind yoked to a material body), it is not uncommon to continue to distinguish one’s inner, private, intellectual life from one’s outer, public behavior and to associate oneself (i.e. one’s mind) with the former rather than the latter. While most have given up the notion that minds are immaterial substances, there is nevertheless a tendency to think in terms of this inner, private “mindspace” – also known as the Cartesian theater. Those who have explicitly given up on Cartesian dualism but who persist in
thinking of minds in terms of a Cartesian theater – i.e. “a centered locus in the brain…where ‘it all comes together’” – are labeled “Cartesian materialists” by Daniel Dennett. Dennett concedes that “perhaps no one today explicitly endorses Cartesian materialism” and that “many theorists would insist that they have explicitly rejected such an obviously bad idea.” However, Dennett notes that “the persuasive imagery of the Cartesian Theater keeps coming back to haunt us – laypeople and scientists alike – even after its ghostly dualism has been denounced and exorcized.”

What explains the persistence of Cartesian materialism? One explanation is our phenomenal experiences. The Cartesian Theater certainly seems to exist when we consider our minds ‘from the inside’. After all, when I close my eyes and imagine Huck Finn floating down the Mississippi River on a raft, it feels a bit like my ‘mind’s eye’ is watching this scene play out on an inner, mental movie screen. For this reason, the notion of the inner Cartesian Theater is hard to shake. Indeed this, as well as other aspects of Cartesian dualism, might well be universal and even hardwired. A recent article by Yale psychologist Paul Bloom, for example, argues that we are “natural-born dualists”. Bloom writes:

We experience the world of material things as separate from the world of goals and desires. The biggest consequence has to do with the way we think of ourselves and others. We are dualists; it seems intuitively obvious that a physical body and a conscious entity – a mind or a soul – are genuinely distinct. We don’t feel that we are our bodies. Rather, we feel that we occupy them, we possess them, we own them.

This duality is immediately apparent in our imaginative life. Because we see people as separate from their bodies we easily understand situations in which people’s bodies are radically changed while their personhood stays intact. Kafka envisioned a man transformed into a gigantic insect; Homer described the plight of men transformed into pigs…

No scientist takes seriously Cartesian dualism, which posits that thinking need not involve the brain. There is just too much evidence against it.

Still, it feels right…

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95 Simon (2005). Simon is a professor of psychology and linguistics at Yale. Crispin Wright makes a similar point (citing similar evidence) about the pervasiveness of the Cartesian picture in Wright (1998). He writes: “The privacy
So, how do these lingering Cartesian presuppositions, especially the idea of an inner Cartesian theater, help to resolve the puzzle of KH? The short answer goes something like this: due to tacit Cartesian assumptions, we generally associate knowledge with the inner theater – i.e. the mind; and we associate abilities and skills with the body. Thus, KH – which is knowledge related to skills and abilities – does not count as “true” knowledge.

So why do we think of KH as knowledge at all, then, if it is “outer” rather than “inner”? Because (a) most KH has an “inner” aspect; and (b) some kinds of KH are mostly “inner”. With respect to (a), consider the example of riding a bicycle – which sometimes involves thinking about riding a bicycle (e.g. “now I have to push the pedals, now I have to steer to the left, etc.) as well as actually riding the bicycle (e.g. pushing the pedals, steering with the handlebars, etc.). As Ryle notes, Cartesian assumptions lead us to separate these two aspects of bicycle riding and count only the “thinking” part as mental (and therefore a candidate for knowledge). The “riding” part is not mental but physical, and so according to these assumptions it is not a candidate for knowledge.

With respect to (b), consider examples of KH such as knowing how to speak/read/write a language, knowing how to reason, and knowing how to compute sums. Such activities can be purely mental – i.e. they can take place in the absence of physical/bodily activity – and so our Cartesian assumptions locate these sorts of activities as candidates for knowledge. It should come as no surprise, too, that such examples of KH are the ones that philosophers typically focus on.

of the inner world is a recurrent idea in literature. It is arguably a presupposition of the whole idea of the continuation of one’s consciousness after death. The thought of the undetectable inverted colour spectrum is something which can engage quite young children without too much difficulty. And in each of these cases, what comes naturally is essentially nothing other than the notion of a kind of privileged observation of one’s own mind, which works, in the ways we have reviewed, to explain the first-third-person asymmetries in ordinary psychological discourse” (p. 24).
The above points can also be illustrated if we think of the Cartesian relation of mind to body using the analogy of a captain’s relation to the ship.\textsuperscript{96} The captain uses knowledge to steer the ship, but the ship’s movements themselves cannot be described as “knowledge”. Similarly, according to our tacit Cartesian premises, a mind uses knowledge to steer the vessel that is its body – but the body’s movements are not themselves considered knowledge.

\textbf{1.5.2 The Rorty/Hacking Solution}

There is, I believe, another unconscious aspect of our epistemological paradigm that helps to explain the Puzzle of KH. It is an aspect of our thinking pointed out, most prominently, by both Richard Rorty and Ian Hacking and it involves the idea that the function of knowledge is to accurately represent, or mirror, the world. Such a conception of knowledge, though not something that philosophers necessarily commit themselves to explicitly, has a powerful hold on modern epistemology and it has the effect of focusing philosophers on propositional knowledge and ignoring KH.

In his book \textit{Philosophy and the Mirror of Nature}\textsuperscript{97}, Richard Rorty notes that philosophers (at least those in the Western tradition) have tended to model knowledge on perception. He notes that Heidegger “…tried to show how the epistemological notion of ‘objectivity’ derives from, as he puts it, (the Platonic identification of)...the reality of a thing with its presence before us. He [Heidegger] is concerned to explore the way in which the West became obsessed with the notion of our primary relation to objects as analogous to visual perception.”\textsuperscript{98} Rorty clearly agrees with this sentiment and writes:

\footnotesize
\begin{itemize}
  \item \textsuperscript{96} In the Sixth \textit{Meditation}, Descartes argues that this is not an exact analogy because we are connected to the body more closely and intimately than a captain is connected to the ship: “I am not only lodged in my body as a pilot in a vessel, but that I am besides so intimately conjoined, and as it were intermixed with it, that my mind and body compose a certain unity.” (Descartes 1901). But the analogy is nevertheless sufficient for present purposes.
  \item \textsuperscript{97} Rorty (1979).
  \item \textsuperscript{98} Ibid, p. 162. The Heidegger quote is from Heidegger (1959), p. 185.
\end{itemize}
…perhaps it helps to think of the original dominating metaphor as being that of having our beliefs determined by being brought face-to-face with the object of the belief…The next stage is to think that to understand how to know better is to understand how to improve the activity of a quasi-visual faculty, the Mirror of Nature, and thus to think of knowledge as an assemblage of accurate representations.  

Though the contents of knowledge states have shifted from picture-like Lockean ideas to linguistic propositions and theories, the notion remains that what such states should do, if they are to count as knowledge, is to accurately represent reality. It is not difficult to see how this epistemological view of knowledge-as-representational leads to a privileging of KT over KH. For if some putative object of knowledge was not the sort of thing that was even capable of representing, then it is not going to find its way to the forefront of epistemological concern. And KH, while it arguably has a representational aspect to it (in many cases), is not primarily about accurately mirroring nature but rather about interacting with and manipulating the external world.

Rorty ultimately wanted to jettison the whole notion of knowledge-as-representational. Hacking, on the other hand, believes that this picture is merely incomplete and needs to be supplemented, as the title of his book, *Representing and Intervening*, suggests. Like Rorty, Hacking argued that philosophers, including philosophers of science, have focused almost exclusively on the idea that the function of knowledge is to accurately represent the world around us. This manifests itself in the philosophy of science literature as a myopic concern with scientific *theories* and a lack of attention paid to the manipulation of, and intervention in, nature in the form of *experimentation*. Hacking notes that “(p)hilosophers of science constantly discuss theories and representation of reality, but say almost nothing about experiment, technology, or

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100 Hacking (1983).
the use of knowledge to alter the world." This claim is, in essence, the Puzzle of KH as applied to philosophy of science! The problem with this myopia, as Hacking notices, is that:

By attending only to knowledge as representation of nature, we wonder how we can ever escape from representations and hook-up with the world. That way lies an idealism of which Berkeley is the spokesman...The harm comes from a single-minded obsession with representation and thinking and theory, at the expense of intervention and action and experiment."102

How to explain the emphasis on theory over experiment? On representing over intervening? Hacking speculates that the explanation is more social than philosophical:

Before thinking about the philosophy of experiments we should record a certain class or caste difference between the theorizer and the experimenter. It has little to do with philosophy. We find prejudices in favour of theory, as far back as there is institutionalized science. Plato and Aristotle frequented the Academy at Athens. That building is located on one side of the Agora, or market place. It is almost as far as possible from the Herculaneum, the temple to the goddess of fire, the patron of the metallurgists. It is ‘on the other side of the tracks’. True to this class distinction, we all know a little about Greek geometry and the teachings of the philosophers. Who knows anything about Greek metallurgy? Yet perhaps the gods speak to us in their own way. Of all the buildings that once graced the Athenian Agora, only one stands as it always was, untouched by time or reconstruction. That is the temple of the metallurgists. The Academy fell down long ago. It has been rebuilt – partly by money earned in the steel mills of Pittsburgh.

In summary, then, the Rorty/Hacking solution to the Puzzle of KH goes as follows. The original question is: why the focus, among philosophers, on KT while showing so little concern for KH? The answer: because it has become part of our conception of knowledge that knowledge is representational. KH is not (at least not primarily) representational and thus does not come onto the radar screens of epistemologists. Rorty and Hacking have separate explanations for this state of affairs (i.e. conceiving of knowledge as having the sole purpose of accurately representing reality), though both trace it back to the beginnings of western philosophy. If they are correct,

101 Ibid, p. 149.
then this could contribute to the explanation as to why KH has been so little studied by philosophers.

1.6 Conclusion

In conclusion, in this chapter I have attempted to demonstrate that KH has been widely ignored by philosophers and epistemologists and that this situation is prima facie puzzling. I surveyed various possible solutions to the puzzle – including the view that KH has been ignored because of widespread belief that it reduces to KT – and found them wanting. Ultimately, I conclude that this state of affairs is explained not by any conscious, rational decision(s) on the part of philosophers which has led them to favor KT over KH. Rather I propose that it is the result of various unconscious premises and assumptions that are built into the fabric of our “epistemological paradigm”. Some of these assumptions are holdovers from Cartesian thought about minds and bodies – especially the conception of minds as “inner theaters” and the body as distinct, yet appended to it. Such assumptions might well be hardwired, though however they happen to come about, they tend to favor KT as a kind of knowledge but not KH.

A second assumption that seems to be built into our epistemological paradigm is the idea that the function of knowledge is to accurately represent reality. Both Rorty and Hacking argue for a version of this claim, and both make the point that this assumption leads to an emphasis on propositional knowledge and away from alternative forms of knowledge, such as KH. Though Rorty argues for moving away from the knowledge-as-representational view, I tend to agree with Hacking that this view of knowledge is fine, though incomplete. And that if we ignore other functions that knowledge serves, we miss not only a big part of the epistemological picture, but also a significant aspect of scientific, technological and cultural history.
Chapter 2: A Folk Theory of KH

2.1 Opening the Investigation

In the Introduction and in the previous chapter, I have argued that philosophers have not paid enough attention to knowledge-how (KH), and that it has been neglected in favor of propositional knowledge, or knowledge-that (KT). I also noted that the philosophical work that has been done on KH has been too narrowly focused on conceptual and linguistic considerations. Those are, of course, criticisms of how things have been done so far, but I have not yet offered a positive approach to the topic. In this chapter, I begin to build a positive case.

I will proceed as follows: I will first outline a folk theory of KH – that is, a theory that summarizes common, pre-theoretical beliefs, assumptions and intuitions regarding this type of knowledge. Then, I will investigate various aspects of this folk theory in light of the best evidence available – including evidence from a variety of the physical and social sciences. I will lay out the folk theory itself in this chapter and consider its details, including some of the difficulties and inconsistencies that arise therein. In later chapters, I will begin a more in-depth investigation of the theory. Before beginning a discussion of the folk theory of KH, however, I want to say a bit about this particular methodology.

2.1.1 Methodology Explained

Why begin with a folk theory rather than applying some other investigative methodology? And why put so much weight on evidence from empirical domains, given that this is a philosophical investigation? Why not, for example, follow Descartes’ lead and use methodological skepticism to investigate this type of knowledge, beginning with only what we can know with certainty (or knowledge we can have the most confidence in)? Or why not begin
with a Socratic search for a definition? Or an analysis of the relevant concepts? Or seek necessary and sufficient conditions as to when something should count as KH?

The short answer is that folk theories are explanations that have (in a sense) stood the test of time and have appeared to be successful explanations of a wide range of phenomena to a large number of people. This gives them a prima facie credibility, which makes them a logical jumping off point in any enquiry that tackles the subject that the folk theory addresses. This does not, of course, mean that such theories are entirely accurate explanations. In fact it might be the case that folk theories are radically wrong; and/or that folk theories have internal inconsistencies that go unrecognized by those who hold them; and/or that folk theories make claims that are untestable and/or unfalsifiable. The point here is not to defend folk theories in general, or any particular folk theory, but rather to point out that since investigations have to start somewhere, we might as well begin with what is commonly accepted as the correct account. If further inquiry (be it conceptual, empirical, etc.) shows that this account is wrong, or needs to be revised, so be it.

2.1.2 Examples of this Methodology: Dennett, Hardin and Kuhn

This methodology is not, of course, original. Folk theories have been the jumping-off point for philosophers and scientists in many domains, most prominently those studying various aspects of the mind (e.g. psychology, consciousness, vision, free will, etc.). For example, Daniel Dennett promotes a methodology called heterophenomenology for studying consciousness – or, rather, for beginning the study of consciousness.¹ The heterophenomenologist begins by neutrally considering folk theories of consciousness, as well as

¹ Dennett introduces this methodology in Dennet (1991) and has since revisited the topic in a number of other books and articles, including Dennett (2003) and (2005). Dennett ends up skeptical of most folk psychology regarding consciousness, but that need not always be the case when applying this method.
first-person reports of the conscious experiences of individual agents. She then proceeds to subject these claims to the rigors of “the methodological principles of science”.

For example:

…most people – “naïve subjects” in the standard jargon – suppose that their color vision extends all the way to the periphery of their visual fields, and they also suppose that their visual fields are approximately as detailed or fine-grained all the way out. They are astonished when it is demonstrated to them that they cannot identify a playing card – cannot even say if it is red or black – even though they can see it being wiggled at the edge of their visual fields, and this is just one of the incontestable facts that play havoc with the folk psychology of vision. What needs to be explained by a science of consciousness in this case is the etiology of a false belief.

In this example, there is a straightforward way of determining whether or not this bit of folk theory (i.e. that color vision extends to the outer edges of our visual field) is true. Other aspects of folk theories will require much more extensive investigation. The principle, however, is the same: assume a neutral stance to the folk theory and then subject it to proper, empirical investigation. In the above example, part of the folk theory needs to be thrown out. That will not always be the case.

Another important point about this example is that even though this particular folk belief turns out to be false, we would still like (ideally) an answer to the question, “why do people think that their visual fields are detailed and colored all the way out?”.

Folk theories, then, not only provide a jumping-off point for further investigation, but they also provide data that a successful theory should ultimately explain.

Interestingly, the domain of color – and color vision – provides another example of philosophers applying this particular methodology. Folk theories about color lead to, for example, the intuition that individual color spectra could be inverted, such that everywhere that you see red, I might see green – and we would never know the difference since behaviorally, we

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2 Dennett (2005), p. 36.
3 Ibid, p. 41.
would be identical. The possibility that this bit of folk theory could be shown to be false on empirical grounds shocked philosopher C.L. Hardin, who noted that it “elicited from me a Hobbesian ‘By God, this cannot be!’”\(^5\). That, in turn, led Hardin to a general investigation of the visual sciences, which he found provided “rich grist for philosophic mills”.\(^6\) Hardin’s investigation changed the direction of the philosophical study of color and color vision. It is safe to say that he achieved one of his main objectives with respect to this domain:

…I wanted to encourage and provoke other philosophers to come to grips with the relevant scientific material, and to promulgate within the philosophical community the opinion that, henceforth, discussions about color proceeding in ignorance of visual science are intellectually irresponsible.\(^7\)

A final example of this sort of thing: Thomas Kuhn challenged what might be called the “folk theory”\(^8\) of science – which envisioned science as a cumulative project in which individual scientists, over the ages, have heaped new discoveries, theories, etc. onto a big pile that we label “scientific knowledge”. This view, Kuhn notes, was ensconced in science textbooks, where:

Scientific development becomes the piecemeal process by which these items [facts, theories and methods] have been added, singly and in combination, to the ever growing stockpile that constitutes scientific technique and knowledge. And history of science becomes the discipline that chronicles both these successive increments and the obstacles that have inhibited their accumulation.\(^9\)

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\(^6\) Ibid, p. xv.
\(^7\) Ibid, p. xvi.
\(^8\) I am using the term “folk theory” very broadly in these examples. There were theories of scientific progress that Kuhn was addressing, and theories of color (and color vision) that Hardin was addressing – so they were not merely challenging pre-theoretic intuitions regarding these subjects. But they were challenging commonly-held, consensus views held by many non-experts. The view that science is an incremental and cumulative enterprise is quite common, I would argue, as is the view that color spectra could be inverted (how else to explain the enduring popularity of this possibility in Intro to Philosophy classes?).
Kuhn’s theory of scientific revolutions, which he arrived at via detailed study of the actual (as opposed to textbook) history of science, demonstrated that this incremental, “development-by-accumulation”\(^{10}\) view of science does not hold up to scrutiny.

### 2.1.3 Applying this Methodology to KH

To some extent, this methodology has made its way into the philosophical literature on epistemology. I am referring to the work done in the area of “naturalized epistemology” – a movement usually traced back to Quine’s 1969 article “Epistemology Naturalized”.\(^{11}\) Epistemological naturalists have begun an “empirical, scientific study of human knowledge”, as philosopher Barry Stroud puts it, and that is consistent with the project I am undertaking.\(^{12}\) However, naturalized epistemologists are open to the same sorts of criticisms that I leveled against epistemologists in general in the previous chapter – namely, that they focus almost exclusively on propositional knowledge (or components of propositional knowledge, such as justification or beliefs), and thus have had little to say about other kinds of knowledge, including KH.

In short, epistemological naturalism has not yet been explicitly and systematically applied to the subject of KH. In fact, if your only source of information on these topics is the recent philosophical literature on KH, you could be forgiven for thinking that the questions surrounding KH (and its relation to KT) are all about language, and about how we use language to ascribe different sorts of knowledge to people (or, more generally, to agents). How so?

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\(^{10}\) Ibid, p. 2.

\(^{11}\) Quine (1969). Quine is usually interpreted as advocating the replacement of (normative) epistemology with (descriptive) psychology – that is, of replacing philosophy with science. Other naturalized epistemologists, however, make the weaker claim that empirical, scientific research should inform the philosophical debates about knowledge. The Quinean position is ultimately inconsistent with my project insofar as I take philosophical methodologies, such as conceptual analysis, to have a role to play in normative epistemology. However, I take the latter position to be consistent with my project. For an excellent resource on naturalized epistemology, see Kornblith (1985).

Consider, for example, the following sentences:

(1) Joe knows how to ride a bicycle
(2) Sue knows that Albany is the capital of New York

These knowledge ascriptions seem different in that the object of knowledge in (1) is an activity while the object of knowledge in (2) is a proposition.

Consider also:

(3a) Joe believes that Albany is the capital of New York
(3b) Sue believes how to ride a bicycle
(4a) Joe claimed that Albany is the capital of New York
(4b) Sue claimed how to ride a bicycle\textsuperscript{13}

Both (3a) and (4a) are acceptable locutions while (3b) and (4b) are not.

From such examples of linguistic differences, some infer epistemological differences.\textsuperscript{14} Or, alternatively, others concede that there are indeed superficial linguistic differences, but that a closer look at the deep linguistic structure of knowledge ascriptions reveals more similarity than difference.\textsuperscript{15} So much so that we need not posit two different kinds of knowledge since one knowledge concept is sufficient. Though these conclusions are opposed, they both stem from observations about knowledge-ascriptions.

This kind of linguistic data is certainly suggestive, and philosophers who have collected and analyzed it have performed a valuable service.\textsuperscript{16} However, the idea that the debate about KH and KT is generated from such linguistic differences alone is remarkably myopic. The notion that KH and KT are distinct kinds of knowledge does not have its origins in the philosophical analysis of language ascriptions; rather, its source is in our everyday experiences, which include, but are not limited to, talking about and ascribing knowledge. This is readily apparent to those

\textsuperscript{13} The examples are adapted from examples in Ryle (1949).
\textsuperscript{14} For example, Carr (1979) and (1981).
\textsuperscript{15} For example, Stanley and Williamson (2001).
\textsuperscript{16} I discuss linguistic issues in a bit more detail below, and then more extensively in Chapter 5.
who have never given a second thought to the grammatical structure of knowledge-ascriptions, but who cannot, say, drive a car with a stick shift, despite having read and understood an instruction manual; or to someone who scrupulously followed the recipe for a dish only to find the result inedible; or to someone who can recognize the genius of a particular stand-up comedian, but who cannot tell a joke to save her life.

These sorts of experiences (and many others, which I catalogue below) underlie and inform our beliefs about KH and its relation to KT – that is, they contribute to what I am calling the folk theory of KH. This theory includes not only claims about KH itself, but also claims about the relation between KH and KT. Linguistic practices are part of this folk theory, which is why I claim that the analysis of such practices plays an important role in the overall project, but they are only part of the theory. As such, a satisfactory theory of knowledge attributions (if it exists) would still leave many key questions related to KH and its relation to KT untouched.

2.1.4 Hacker’s “It is not Philosophy” Objection to this Methodology

I suspect that many philosophers would have no objections to this method in general; some, however, might object by claiming that it is not properly philosophical. That is, it might be objected that this methodology is an empirical endeavor, best left to the appropriate scientists and scholars – not philosophers. Such a viewpoint is promoted by philosopher Peter Hacker, who (writing on the subject of philosophy of mind and neuroscience) claims that:

Empirical questions about the nervous system are the province of neuroscience. It is its business to establish matters of fact concerning neural structures and operations. It is the task of cognitive neuroscience to explain the neural conditions that make perceptual, cognitive, cogitative, affective and volitional functions possible. Such explanatory theories are confirmed or infirmed by experimental investigations. By contrast, conceptual questions (concerning, for example, the concepts of mind or memory, thought or imagination), the description of the logical relations between concepts (such as between the concepts of perception and sensation, or the concepts of consciousness and self-consciousness), and the examination of the structural relationships between distinct
conceptual fields (such as between the psychological and the neural, or the mental and the behavioural) are the proper province of philosophy.\(^{17}\)

Hacker, then, believes in a bright line distinguishing the empirical from the philosophical (i.e. the conceptual), and he goes on to claim that “we do not think that empirical research can solve philosophical problems, any more than it can solve problems in mathematics”\(^{18}\); and “…the only ways a conceptual investigation can assist an empirical subject are by identifying conceptual error (if it obtains) and providing a map that will help prevent empirical researchers from wandering off the highroads of sense.”\(^{19}\)

### 2.1.5 Response to Hacker

This is obviously a huge topic about nothing less than the proper role and method(s) of philosophy, and an exhaustive discussion is beyond the scope of this project. However, a few brief points are worth stating. First, while I certainly agree with Hacker that philosophers are (or can be) particularly adept at performing the conceptual work that he describes, I would argue that philosophers need not be limited to that role. I have provided some examples above of how philosophers, and philosophical domains, have been informed by (and, in turn, have informed) empirical domains in ways that Hacker seems to reject. Dennett makes a similar point in his response to Hacker’s claim that empirical research cannot solve philosophical problems:

> Well of course not; empirical research doesn’t solve them, it informs them and sometimes adjusts or revises them, and then they sometimes dissolve, and sometimes they can then be solved by further philosophical reflection (emphasis in the original).\(^{20}\)

A second point about Hacker’s position is that the bright line that he attempts to draw between empirical and conceptual turns out, upon inspection to be not so bright. Doing the sorts

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\(^{17}\) Bennett, Dennett, et. al. (2009), pg. 4. This book excerpts several chapters from Hacker and Bennett (2003) and includes rebuttals from philosophers Daniel Dennett and John Searle.

\(^{18}\) Ibid, p. 80.

\(^{19}\) Ibid, p. 13.

\(^{20}\) Bennett, Dennett, et. al. (2009), p. 80.
of conceptual work that Hacker says philosophers should be limited to involves investigation and analysis of language, and as Dennett points out, “no matter what any philosopher may say, examining the use of words is an empirical investigation.”\(^{21}\) This is especially relevant to my project because, as discussed above, the philosophical work that has been done on KH has tended to be conceptual and linguistic, and my claim is that this conceptual and linguistic work should be seen as continuous with my project, as opposed to being seen as a competing methodology.

### 2.1.6 The “Who Cares about Methodology?” Objection

A final point regarding this methodology that I have been describing: the questions might be asked: “Why make such a fuss about using this particular methodology? Isn’t it just one of many equally valid ways of approaching the topic? And shouldn’t we, as philosophers, prefer the use of more philosophical methods of conceptual and linguistic analysis?”

In response, I would argue that this methodology is preferable for at least two reasons: first, our choice of methodology will significantly affect how we proceed with our investigation; and, second, it will affect what counts as a satisfactory endpoint to the investigation. Let me say a bit briefly about each of these points before proceeding to a discussion of Folk KH.

### 2.1.7 First Response

The first reason methodology matters is because it will determine how we proceed with the investigation into KH and its relation to KT. If you believe, for example, that linguistic considerations are what underlie the possibility of a distinction between KH and KT, then you will probably approach the investigation by taking a closer look at the linguistic data. That is, you will consider the syntactic and semantic properties of KH-ascriptions and KT-ascriptions and attempt to determine whether or not the original observations (e.g. that KH- and KT-}

\(^{21}\) Ibid, p. 81.
ascriptions have different objects) hold up under further scrutiny. On the other hand, if you believe that a broader range of considerations (including personal and interpersonal experiences) underlies the possibility of a distinction between KH and KT, then you will probably approach the investigation much differently, since investigating experiences is very different from investigating language. Most notably, if experience is part of the basis for making this distinction, then linguistic data is not going to resolve the debate conclusively, since it will tend to leave experiential questions unresolved. So, for example, even if it turns out that KH and KT ascriptions have similar underlying structures, we would still want to know why it is that one never seems to forget how to ride a bicycle, and yet one does often forget the state capitals. Or how someone could be a mathematical genius but not be able to figure out how to make a pot of coffee.

2.1.8 Second Response

The second reason that methodology matters (closely related to the first) is because it will affect what counts as a satisfactory endpoint to the investigation. If you believe that linguistic considerations alone are what underlie the possibility of a distinction between KH and KT, then you will probably be satisfied that the investigation is complete once the linguistic data is accounted for. That is, once we have figured out the best syntactic and semantic accounts of knowledge ascriptions, we will know (or have strong reasons to accept) whether or not KH and KT are distinct kinds of knowledge. However, if you believe that a broader range of considerations (including personal and interpersonal experiences) underlies the possibility of a distinction between KH and KT, then you will want the complete theory of KH and its relation to KT to explain more than just the linguistic data.
A final, more general point about why our investigation should go beyond the linguistic data: even if it turns out that, say, KH- and KT-ascriptions have similar syntactic and semantic structures, this would not conclusively resolve the metaphysical questions about the nature of, and relation between, the two types of knowledge. That is because: (a) the linguistic similarities could be explained by the possibility that KH and KT are both kinds of knowledge, and so are likely to have similar linguistic properties; and (b) language does not always accurately reflect reality, which makes deriving conclusions about the world from linguistic data a dicey business.\textsuperscript{22}

\textbf{2.1.9 Summary}

In conclusion it is my position that empirical domains can and do inform philosophical domains, and vice versa. I have not attempted to provide a proof of this position, though I have tried to present some evidence for it, including positive evidence in the form of examples, and negative evidence in the form of critiques of objections. Additionally, I have argued that methodology matters, and we should begin this investigation into KH and its relation to KT by elaborating a broad, folk theory and then investigating its various aspects as thoroughly as possible. I will lay out the beginnings of a folk theory in the rest of this chapter. In the next few chapters, I consider further empirical evidence that informs this debate – beginning with neurological evidence and moving on to evidence from studies of intelligence and educational psychology.

\textbf{2.2 A Folk Theory of Knowing-How}

A folk theory of any subject, S, is meant to be an account of what “the folk” think about S. That is, it is meant to explain the views that ordinary people – those who have no particular, specialized knowledge of S – hold at a given time. How does one determine the views that

\textsuperscript{22} I make this argument more thoroughly in Chapter 5, when I discuss Stanley and Williamson’s account of KH.
ordinary people have about S? Well, you can ask them, of course. And you can observe them. And you can listen to the things they say to each other about S. You can consider the role that S plays in various aspects of the culture, and how aspects of S relate to other parts of the culture. Those are the sorts of things I have done here with respect to KH (and its relation to KT) – using both my own personal experiences, and the experiences of many others who have written on this topic. We should not, of course, expect a folk theory to be tidy; but it should provide an account of S that matches up pretty closely with ordinary views on the subject.

2.2.1 The Relation Between KH and KT

I have previously noted that there are a number of possible positions that might be held, or have been held, with respect to KH and its relation to KT. Some argue that KH reduces to KT. Others argue that the converse is true. Others argue for a priority relation of some sort, but not a reduction. Yet others argue for a view that KH is a distinct kind of knowledge from KT – a view hereafter referred to as the Distinction Hypothesis (DH). It is safe to say, from a folk theoretical perspective, that DH is the default position. That is, pre-theoretically it is both plausible and common to distinguish between KH and KT and to think of them as distinct, unrelated kinds of knowledge. Philosophers, even philosophers who argue for and against DH, concede this point. Ryle, for example, argues that “(p)hilosophers have not done justice to the distinction which is quite familiar to all of us between knowing that something is the case and knowing how to do things” (emphasis added). And Stanley and Williamson, who oppose DH, concede that “[Ryle’s] view that knowledge-how is fundamentally different from knowledge-that

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23 By that I mean, listen to what they have had to say about folk views. And I do not just mean philosophers, but those writing about KH in other disciplines – see section I.2 of the above Introduction for some of those resources.
24 See Chapter 1, especially section 1.4.3.
is *widely accepted*, so much so that arguments for it are rarely presented, even in the works of those philosophers who crucially rely upon it” (emphasis added).\(^{26}\)

Additionally, there is much anecdotal evidence that such a distinction is widely accepted. For example, it is a common observation that some (perhaps most) people have an aptitude for acquiring (or demonstrating, or teaching, etc.) one kind of knowledge but not the other. Indeed, this phenomena is so widely believed that it is the basis for a number of stereotypes from popular culture – for example, the genius scientist/professor who possesses lots of complex scientific/abstract knowledge but cannot tie his own shoes; or conversely, the Mr. Fix-It type who can perform complex mechanical feats but who lacks the related propositional knowledge.\(^{27}\) These sorts of stereotypes imply that the two sorts of knowledge are seen as separable and distinct and not merely two aspects of the same underlying phenomenon.\(^{28}\)

Furthermore, our social and cultural experiences reveal to us that such differences (in, for example, aptitudes) are, to a certain extent, recognized by educational institutions (which distinguish vocational education from academic education), scientific institutions (which distinguish applied and theoretical branches of the sciences), and legal institutions (which

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\(^{27}\) I recently saw an example of this on a rerun of the TV show *Frasier*, in which Frasier and his brother Niles (who both have MDs in psychiatry and are stereotypical intellectuals) fail miserably when they attempt an auto repair class. Amusingly, the episode was called “Motor Skills” (it was from the shows 8\(^{th}\) season, 2001). Another variation of this theme comes from the 1985 movie *The Breakfast Club*, about high school students serving a Saturday detention. The intellectual, nerdy character (played by Anthony Michael Hall) confessed to failing shop class because he could not figure out how to make a lamp (despite his extensive knowledge about electrical theory); whereas the stoner character, an academic failure (played by Judd Nelson) was, naturally, a whiz in shop class. Additionally, much humor is wrung from these sorts of stereotypes on the sitcom *Scrubs*, in scenes between the janitor character (the character’s name has never been revealed) and the doctors.

\(^{28}\) It is the case that those views which take KH to be a kind of KT, or reducible to KT (or vice versa) would still admit a distinction of a sort between the two types of knowledge. But on such views the two kinds of knowledge would nevertheless be related, and overlap, in various significant ways; whereas folk theory tends to indicate a more fundamental difference in kind between the two, as the examples provided indicate, which is more plausibly interpreted as reflecting the DH.
distinguish copyrights from patents). So there is good reason for including, in our folk theory of KH, the claim that the two sorts of knowledge are distinct (i.e. for including DH).  

But why do we, pre-theoretically, distinguish these two kinds of knowledge? And what characteristics do we assign to the two sorts of knowledge? Broadly speaking we differentiate the two kinds of knowledge based on a broad range of experiential considerations including personal, interpersonal and social experiences. For example, experience tells us that the process of learning how to do something, like ride a bicycle, feels different, in a number of ways, from learning that something is the case (e.g. that Albany is the capital of New York). The same can be said of other knowledge-related activities. Consider the following activities:

(5a) Demonstrating to someone that you know that Albany is the capital of New York  
(5b) Demonstrating to someone that you know how to ride a bicycle  
(6a) Remembering that the capital of New York is Albany  
(6b) Remembering how to ride a bicycle  
(7a) Teaching someone that Albany is the capital of New York  
(7b) Teaching someone how to ride a bicycle  

The experiences in each case, I would argue, seem significantly different. And it is not only our firsthand experiences that lead us to this conclusion. Such personal experiences are reinforced by experiences with others, and social experiences in general. In the next section, I will consider some aspects of our personal experience that lead us to pre-theoretically distinguish these two sorts of knowledge. In later sections, I will discuss interpersonal and social considerations.

2.2.2 What Personal Experience Tells Us

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29 Not too much hangs on any particular aspect of the folk theory delimited herein. We are, after all, considering the elements of this theory to be defeasible, and subjecting them to scrutiny and investigation. So long as the folk theory is in the right neighborhood and does not contain major hidden assumptions and/or category errors, it will serve the function required of it to make this methodology fruitful.
Consider a paradigm example of KH – knowing how to ride a bicycle. It is not clear that the mere possession of such knowledge itself is associated with any particular phenomenological “feel”. The same could be said about paradigm instances of KT. It is not clear that it feels like anything, from the inside, to possess the knowledge that Albany is the capital of New York (for example). Such “knowings” do not appear to exert any phenomenological pressure. However, consider what it feels like to acquire these respective bits of knowledge. That is, compare what it feels like to acquire, or demonstrate, a paradigm piece of KH, such as learning how to ride a bicycle, with what it feels like to acquire, or demonstrate, a paradigm case of KT, such as learning the state capitals. Significant experiential contrasts in these cases are apparent.

2.2.3 Temporal Difference

First, there seems to be, in general, a temporal difference with respect to the experience of learning that and learning how. Learning that Albany is the capital of New York can, in principle, take place in an instant. One could read this fact in a book, or hear it from a teacher, etc. and one could then be said to know it. From the inside, acquisition of such knowledge feels instantaneous (given certain background information about states, capitals, etc.). Of course, time and effort are often required in order to retain such knowledge, or to accumulate many bits of such knowledge, such as learning all the state capitals; but it at least seems possible to acquire the individual bits very quickly. This does not seem to be the case with respect to acquiring knowledge of how to ride a bicycle. Such knowledge is not gained instantaneously by reading

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30 In this section, I deal with paradigm cases of KH and KT. In later sections, I consider issues related to borderline cases, mixed cases, etc.
31 I am discussing phenomenological issues here in the spirit of what Dennett calls “heterophenomenology” – that is, I take such experiences at face value, but not as infallible reports of what is actually the case. See my discussion of heterophenomenology above in section 2.1.2.
32 Perhaps this is a result of choosing disanalogous examples – i.e. since knowing how to ride a bicycle is a complex bit of KH, while knowing a state capital is a simple bit of KT. I say more about this issue of simplicity and
a book, or hearing someone talk about riding a bicycle (though someone could certainly learn
some things about riding a bicycle this way). The knowledge of how to ride a bicycle seems to
be attained gradually, over time. Gilbert Ryle makes a related point in his book *The Concept of
Mind*:

> Learning how or improving in ability is not like learning that or acquiring information. Truths can be imparted, procedures can only be inculcated, and while inculcation is a gradual process, imparting is relatively sudden. It makes sense to ask at what moment someone became apprised of a truth, but not to ask at what moment someone acquired a skill.\(^33\)

This quote alludes not only to a temporal difference (“gradual” versus “relatively sudden”) but also to a distinction related to the notions of discrete and continuous processes. Knowledge of a proposition, upon possession seems to be “swallowed whole”; whereas knowledge of how to perform a skill or ability is a somewhat continuous process that tends to happen over time in stages.\(^34\)

These differences hint at another apparent distinction between acquiring the two kinds of knowledge, discussed in the next section.

### 2.2.4 Rehearsal Difference

In addition to (and related to) the temporal difference, there also seems to be what might be called a *rehearsal* difference between instances of learning-how and learning-that. This is related to the temporal difference in that the possibility of acquiring knowledge-that instantaneously implies the possibility of coming to know it without having to practice or rehearse it. Again, practice and rehearsal might be useful in retaining such knowledge, and

\(^33\) Ryle (1949), p. 59.

\(^34\) I discuss the empirical evidence for this “staged process” aspect of KH in Chapter 4.
repetition over time can help one to form the mental associations necessary for remembering or recalling such knowledge. But strictly speaking, it does not always seem necessary. Put another way, it is possible that one could ask “what is the capital of New York?” and be told “Albany” and then, ever after, simply remember it without ever having to remind oneself or refresh one’s memory at some later point. This does not seem to be the case with respect to learning how to ride a bicycle. Practice and rehearsal appear to be required (which explains why such knowledge cannot generally be attained instantaneously).

So far, then, our folk theory of KH contains the following claims: (a) the Distinction Hypothesis (DH); (b) the claim that KT can potentially be acquired instantaneously (or at least relatively quickly) while acquiring KH often takes time; (c) the claim that acquisition of KT happens in discrete bits while acquisition of KH is continuous; and (d) the claim that acquiring KH requires practice or rehearsal while acquiring KT does not. It might be argued that the above differences are not as stark as I am reporting them to be. After all, the process of learning the state capitals does take practice and rehearsal – and therefore, it takes time as well. However, while that may be true, it is generally the case that individual pieces of knowledge-that (i.e. propositions, such as “Albany is the capital of New York”) seem to be acquirable instantaneously – not that masses of information can be learned with such speed.

Additionally, while it is true that even learning single propositions might sometimes require repetition over time, note that the sort of repetition and rehearsal commonly used to learn the state capitals – I am thinking of methods such as mental/oral repetition, note cards, mnemonic devices, etc. – is quite different from the kind of repetition and rehearsal commonly used to learn how to ride a bicycle. One could just as easily use note cards (for example) to learn the world capitals, the bones in the human body, or the St. Crispin’s Day speech from Henry V.
Learning how to ride a bicycle, on the other hand, does not seem like something that can be done with note cards or by reading a book that provides instructions as to how to ride a bicycle. As David Lewis noted, “(y)ou can’t learn it by being told about the experience, however thorough your lessons may be.” In order to learn how to ride a bicycle, it seems that one must, at some point, get on an actual bicycle and practice.

Note that the practice here is practice of the activity being learned and does not necessarily transfer to other kinds of KH (in the way that methods for learning KT seem to transfer to different subjects). Put another way, “rehearsing” propositional knowledge of the state capitals can look exactly the same as “rehearsing” the multiplication tables, the bones in the human body, or the St. Crispin’s Day speech (though of course the content of the rehearsal materials – be they note cards, books, audio tapes, etc. – will be different). But rehearsing how to ride a bicycle is going to look very different from rehearsing how to drive a car. One cannot practice bicycle-riding by taking driving lessons.

This suggests something like a quantitative/qualitative distinction between the two kinds of knowledge. Propositions, it seems, differ in properties such as length, complexity, difficulty in understanding, etc. but qualitatively speaking a proposition is a proposition is a proposition.

At first glance, there do not seem to be many examples of KT that one could not, at least in principle, acquire by reading a book. Skills and abilities, however, seem to differ not just quantitatively but also qualitatively. There are, of course, degrees of similarity with respect to

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35 Lewis (1990), p. 499.
36 Of course if the knowledge is similar enough, one might learn two things by rehearsing one. One could learn how to drive a Honda by practicing in a Ford. And Mr. Miyagi famously taught his protégés how to do karate by having them do things like paint fences and sand floors in the Karate Kid movies. My point is only that methods for learning how to do things do not tend to generalize in the way that methods for learning propositional knowledge do.
37 A way of illustrating this point might be to consider the sorts of college courses you can take online these days (e.g. Introduction to the Principles of Biology) versus those that you cannot (e.g. Biology Lab). There are some propositions that could not be acquired by reading a book – for example, propositions relating to personal experience, such as knowing that one is hungry or thirsty, knowing that one feels cold, knowing that the ball was a homerun as soon as it left the bat, etc.
some skills and abilities (learning how to do one dance might be quite helpful in allowing one to learn others), but there are also stark qualitative differences with regard to others (e.g. learning how to do a somersault seems vastly different from learning how to fly a kite).

2.2.5 Proprioception

Another commonly accepted difference between acquiring the knowledge that Albany is the capital of New York and the knowledge of how to ride a bicycle is, again, related to the first two; namely, acquiring knowledge of how to ride a bicycle seems to involve proprioception. Neurologist Oliver Sacks characterizes proprioception as:

…that continuous but unconscious sensory flow from the movable parts of our body (muscles, tendons, joints), by which their position and tone and motion are continually monitored and adjusted, but in a way which is hidden from us because it is automatic and unconscious.  

This kind of perception (i.e. this continual monitoring and adjusting of the body) appears to play a major role in learning how to balance, pedal and steer a bicycle. However, it seems to play no role in acquiring knowledge of the state capitals. This general point would appear to explain why acquiring KH often requires the sort of practice and rehearsal that it does, which in turn explains why KH tends to take time to acquire as well.

If proprioception is conceived of as a sense modality, though (like seeing and hearing), it might seem odd to invoke it to distinguish kinds of knowledge. After all, we do not generally separate bits of knowledge into distinct categories based on which sensory modality was used to acquire it. And we would not classify the knowledge that Albany is the capital of New York

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38 Sacks (1985), p. 43. According to Sacks, proprioception was ‘discovered’ by C.S. Sherrington in the 1890s who called it “our secret sense, our sixth sense” in Sherrington (1906).

39 I will consider instances of KH that do not involve proprioception in section 2.3 below. I note there that while it is true that some instances of KH seem not to require proprioception, there do not seem to be many instances of KT that do require proprioception – though knowing that I am balancing on one foot, for example, might indicate a sort of exception.
differently, depending on whether it was acquired by the eyes or by the ears. So why invoke proprioception to distinguish KH from KT?

For the purposes of this chapter – establishing a folk theory of KH – it is enough to simply note that we do so. That is, we do generally distinguish knowledge involving proprioception from knowledge that does not. It is up to a theory of KH to explain why we do so. Let me anticipate my theory of KH a bit, though, and provide the beginnings of an answer to this question. The key is to understand that we distinguish the kinds of knowledge based not on mode of acquisition, but rather based on the function or purpose they serve. The function or purpose of KT is representational. Knowing that a proposition is true is having an accurate picture of the world (or some part of it). The five traditional sensory modalities provide information that contributes to constructing such representations. Proprioception, on the other hand, is rarely required. The function of KH, on the other hand, is practical, or action-directed. Actions often involve bodily motions, and learning how to do something that involves bodily motion (e.g. riding a bicycle) requires proprioceptive input.

Proprioception might seem like a complex notion to include in a discussion of pre-theoretic reasons for distinguishing KH and KT. However, I am not suggesting that those learning how to ride a bicycle are cognizant that they are applying or incorporating something called “proprioception”. Rather, I am suggesting that it is a commonly held view of KH (such as learning how to ride a bicycle) that it involves learning how to control one’s “muscles, tendons, joints” in very specific ways – i.e. it involves acquiring knowledge, from the inside, as it were, about how one’s body works in various situations – and that is proprioceptive (i.e. derived from proprioception). Acquiring propositional knowledge is generally held to lack this feature.

2.2.6 Learning How as a Process
Another apparent experiential difference between learning how to ride a bicycle and learning that Albany is the capital of New York is (again) related to the differences discussed above. As already noted, learning how to ride a bicycle requires time, rehearsal and proprioceptive input. Typically, a beginner concentrates very hard and expends much mental and physical effort in performing the various activities involved in bicycle riding – i.e. balancing, steering, braking, etc. After a bit of practice, though, certain aspects become a bit easier and attention can then be shifted to other aspects of the activity – those that remain problematic. After yet more practice, one can breathe a bit easier when riding until eventually, bicycle riding becomes second nature and very little attention needs to be paid to the details at all. Once one reaches this stage, one is said to be able to ride a bicycle “without thinking”, and indeed, at this stage one can occupy one’s mind with subjects totally unrelated to bicycle riding and still be able to ride perfectly well.\footnote{I discuss empirical evidence for, and more information about, this process in Chapter 4.} In short, then, acquiring KH often involves this multi-stage process (where the stages are heterogeneous) that one proceeds through over time (though how much time and effort the process requires depends, in large part, on the complexity of the skill one is learning).

This pattern of intense concentration at the beginning of the acquisition process, which gradually decreases and disappears with more and more practice is what makes it sensible to talk about having “partial” KH. A person towards the beginning of this process might be said to “sort of” know how to ride a bicycle, while a person at the middle or end of the process would be said to “know better” how to ride a bicycle, or at the extreme end, would be said to be an expert bicycle rider.

The above-described process that accompanies acquisition of KH again seems absent when it comes to acquiring KT. It is not exactly accurate to say (as some do) that partial KT
does not exist. What are we to say, after all, of someone who knows that the name of the capital of New York begins with the letter “A”, and then produces the entire name when given the second and third letters? It does not seem unreasonable to describe such a person as “sort of” knowing the capital of New York. Additionally, it is not uncommon to expend great mental effort at the beginning of the process of learning the state capitals, and then less and less as one rehearses this “knowledge” and becomes more of an expert at naming the state capitals. Nevertheless, the process seems significantly different from that described above with respect to KH. In the case of KT, the process seems to get easier because the mental association between the state and its capital becomes stronger and stronger (e.g. when you think “New York”, “Albany” comes immediately to mind). Whereas in the case of KH, strengthening of conscious mental associations does not explain the increase in expertise. Just the opposite, in fact, since as one’s bicycle riding skills increase one need not, it seems, explicitly think about riding the bicycle at all – and in fact, explicitly thinking about riding the bicycle at this stage can be a source of trouble.

It is because the skills involved in learning how to ride a bicycle are proprioceptive that seems to partly explain this difference. In learning how to ride a bicycle one is, in part, training one’s body, and this is often done through repetition, and trial and error, which is a cognitive process (in that one must consciously make adjustments after the trials in order to avoid the errors), but one which results in physical change as well as mental change. One does not memorize how to balance while pedaling, for example. Once one’s body “learns” how to do these things, they become automatic, and to a large extent independent of cognition – which is,

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41 Perhaps this might be written off as a problem with recall rather than with knowledge. But other scenarios of ‘partial KT’ can be imagined – such as someone who claims to be 95% sure that Albany is the capital of New York.
42 I am referring, here, to the familiar experience of being in the midst of performing some activity and then stopping to think explicitly about what one is doing and thereby interrupting the flow of the activity (or, worse yet, coming to a crashing halt – sometimes literally).
again, why people describe themselves, once they have become good as something, as being able to do it “without thinking”. It would seem odd if someone claimed (and meant it literally) that she could name the capital of New York (or all the state capitals) without even thinking about it.

That this whole process of acquiring KH seems different from what is involved in acquiring KT is reflected in many common expressions and clichés related to KH. Consider, for example, the common observation that, once learned, one “never forgets” how to ride a bicycle. And that even if one has not been on a bicycle for years, one can quickly get the hang of riding again, even if one starts off a bit rusty. Such observations do not seem to apply to knowing that Albany is the capital of New York (e.g. “I was a little rusty when I first tried to remember that Albany was the capital of New York, but I got the hang of it quickly”). Also, consider that a familiar piece of advice for someone learning (and performing) a skill is “don’t over-think it!”.

Again, it might be argued that this “process” distinction stems from differences in the complexity of the tasks involved, rather than a qualitative difference with respect to the two kinds of knowledge. If we consider a relatively easy KH-related task, such as opening a door by turning the doorknob, and compare that to a relatively complex KT-related task, like knowing all fifty state capitals, would the point still hold? I think that it would. The general point is that with propositional knowledge, no matter how complex, there is always a “calling to mind” involved in activities related to that bit of knowledge (learning, remembering, demonstrating, etc.). That calling to mind becomes quicker and quicker, and easier and easier, with rehearsal over time, but it nevertheless contrasts with the “doing without thinking” that is often the end state of the process of acquiring KH.

2.2.7 Other Knowledge-Related Activities
Above I have been focusing on comparing learning how to ride a bicycle and learning that Albany is the capital of New York. However, a bit of reflection on other knowledge-related activities reveals similar (though not exact) apparent differences with respect to KH and KT. Consider, for example, the experience of demonstrating KT compared to demonstrating KH. Many of the same distinguishing characteristics discussed with respect to learning seem to apply here as well. One can demonstrate one’s knowledge of the capital of New York in a moment, by answering a question, while demonstrating one’s knowledge of how to ride a bicycle would take a bit of time. Similarly, demonstrating one’s bicycle-riding knowledge would involve proprioceptive input, whereas demonstrating one’s knowledge of the state capitals would not.

Or consider the differences involved in teaching someone how to ride a bicycle versus teaching someone that Albany is the capital of New York. The temporal difference definitely applies here, as does the rehearsal difference. And because learning how to ride a bicycle involves proprioception, teaching someone how to ride a bicycle will generally require more of a hands-on methodology than teaching someone the capital of New York. Teaching the former might involve, for example, the teacher running alongside the bicycle and balancing it while the student gets the feel for steering and braking. For these sorts of reasons, it is often the case that KT can be taught in a typical classroom with desks and chalkboard, while KH requires something more (e.g. in the case of bicycle-riding, a bicycle and some open road).

2.2.8 Summary

In summary, personal experience with knowledge-related activities such as learning, demonstrating and teaching can contribute to an explanation of why we believe, pre-theoretically, that KH and KT are distinct. Here are the folk beliefs that I have so far considered:

43 Cf. footnote 37 above about the kinds of college courses you can and cannot take online. Again, exceptions would be instances of KT that involve direct experience – e.g. knowing that a rose smells like this.
(a) the Distinction Hypothesis (DH);
(b) the belief that KT can be acquired (demonstrated, taught) instantaneously (or at least relatively quickly) while acquiring KH takes time;
(c) the claim that acquisition of KT happens in discrete bits while acquisition of KH is continuous
(d) the belief that acquiring (demonstrating, teaching) KH requires rehearsal while acquiring KT does not;
(e) the belief that differences in propositions are quantitative while differences in skills and abilities can be both quantitative and qualitative.
(f) the belief that acquiring (demonstrating, teaching) KH requires proprioception while acquiring KT does not;
(g) the belief that acquiring (demonstrating, teaching) KH requires a process that is very different from that required for acquiring (demonstrating, teaching) KT.

I do not mean to imply that the differences are exactly the same for all of these different activities (acquiring, demonstrating, teaching). And there are other knowledge-related activities that I have not discussed (e.g. remembering, revising, applying, etc.) that might be incorporated into a complete folk theory of KH. Thus I am not claiming that the above list of differences is exhaustive. Rather, I am attempting to give a sense of the various folk beliefs with respect to these two sorts of knowledge and their relation. In the next section, I consider various social experiences that constitute and contribute to this folk theory.

2.2.9 What Social Experience Tells Us

In addition to folk beliefs that derive from personal experience, there are also beliefs relating to our experiences with others, and with society in general that deserve mention. In this section, I will consider a number of folk beliefs about KH and KT that stem from interpersonal and social experiences.

2.2.10 Aptitudes

As mentioned above, a common social observation with respect to KH and KT is related to the varying aptitudes that people have for each kind of knowledge, respectively. In our personal experiences, as well as in our interactions with others, it appears that many people have a
stronger aptitude for one kind of knowledge over the other. Some are particularly good at picking up skills and abilities while others are better at learning facts and theories. There are, of course, those whose aptitudes are somewhat evenly balanced, and others with a more complicated mixture of aptitudes. However, the fact that aptitudes seem to track the KH/KT divide to some extent is suggestive and informs our folk beliefs about these two sorts of knowledge. In my own family, my older brother and I both excelled in the classroom (like our mother) while struggling with mechanical tasks. My younger brother, on the other hand, had a mechanical mind (like our father) but not an academic one. When I mention this anecdote to people, many report similar divisions within their own families. Whether such anecdotal evidence would hold up to scrutiny is a question to be considered later, of course. But that such divisions are commonly perceived is reflected in our social practices, language and popular culture. For example, we distinguish those who are “street smart” from those who are “book smart”. And in schools, students are often steered into either an academic or vocational curricula, depending on their apparent aptitudes.

2.2.11 Further Institutional Divisions

Our social experience reveals that schools are not the only social institutions that distinguish, to some extent, the two types of knowledge. The sciences are generally divided into “theoretical” and “applied” branches – a distinction that roughly tracks the KH/KT distinction in that the theoretical branches of the sciences are more focused on acquiring descriptive knowledge about what the world is like, whereas the applied branches are more focused on figuring out how theoretical knowledge can be applied to solve practical problems. For example, an academic or research chemist might focus on demonstrating that such-and-such a protein plays such-and-such a role in the biochemical processes that govern living organisms. A
pharmaceutical chemist, on the other hand, would need to focus more on *how* to mix various chemicals so as create the desired medicines.\(^{44}\) This distinction is reflected not only at universities – where the applied sciences are often lumped in with the engineering department, as opposed to with arts and sciences – but also in scientific publications, in that theoretical and applied topics are usually relegated to different textbooks and journals.

Similarly, legal institutions and institutions related to intellectual property distinguish, to some extent, between KH and KT. For example, if you figure out *how* to do something in a new and original way, you can patent your process/invention. According to the U.S. Patent Office, “any person who invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent.”\(^{45}\) Acquisition of a patent involves the ability to demonstrate the invention or process being patented (e.g. *knowing how* to construct and operate your new invention). Propositional knowledge (in and of itself), on the other hand, cannot generally be patented – though it can be protected via copyright. The patent office notes that, “it has been held that the laws of nature, physical phenomena, and abstract ideas are not patentable subject matter.”\(^{46}\) Thus, Einstein’s announcement of the fact that \(E=mc^2\) is *not* patentable, while figuring out *how* to more efficiently translate mass into energy is.

### 2.2.12 Emotional Differences

An additional social difference with respect to acquiring these two types of knowledge is that acquisition of KH sometimes has strong emotional associations as well as deep cultural

\(^{44}\) It is, of course, true that theoretical scientists require much KH to do their work and that applied scientists require much knowledge of scientific theory (i.e. much KT). I address this subject – cases which include both KH and KT – in section 2.3 below.

\(^{45}\) All information about patents and copyrights comes from the U.S. Patent Office website at: [http://www.uspto.gov/web/offices/pac/doc/general/index.html#ptsc](http://www.uspto.gov/web/offices/pac/doc/general/index.html#ptsc)

\(^{46}\) Ibid
meanings which are generally absent in the case of acquiring propositional knowledge. For example, for many a child, learning from one’s father how to throw a baseball is a stereotypical “rite of passage” in this culture. Other such examples include learning how to bait a fishing pole, learning how to drive a car, learning how to swim, learning how to change a diaper, learning how to cook, and, not surprisingly, learning how to ride a bicycle. It is difficult to think of analogous examples with respect to KT. While learning the state capitals is something that most every child does in this country, it does not, I would contend, have the emotional or cultural associations of the above examples.

What is the source of such emotional differences? Well, in some instances, learning how to do something, like ride a bicycle or drive a car, involves a bit of physical risk, which will provoke emotional responses. However, not all of the activities listed above involve physical risk. Another possible explanation for the emotional asymmetry is that learning the activities listed above tends to expand one’s world in a number of ways. A child who can ride a bicycle (or drive a car) lives in a much bigger world, from her perspective, than she did before acquiring this knowledge. It should not be surprising that such world-changing knowledge would be accompanied by emotional reactions. A third possibility is that some of the examples listed above (such as riding a bicycle, throwing a baseball and changing a diaper) are markers of life changes – that is, they come at points in time at which our lives are shifting relatively dramatically (from infant to child, from child to adolescent, or from child to parent, etc.). And again, such shifts will tend to be accompanied by strong emotions. These causes might well overlap in some cases, as well.

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47 I leave it as an open question as to whether KH tends to be more meaningful in this sense across cultures (though with different activities being meaningful in different cultures), or whether in some places KT tends to be more meaningful than KH – though I suspect the former. If it is a general phenomenon, an account of KH should have something to say about it.
Might not we say the same things about some instances of KT, though? Again, it is difficult to think of candidate pieces of KT that would typically seem to share any of these characteristics. It is not, in general, physically dangerous to acquire propositional knowledge.\textsuperscript{48}

And while KT can certainly expand our world in metaphorical ways, it does not generally do so directly, as in cases of KH (at least not in and of itself). Finally, it is difficult to think of instances of KT that mark life changes in the way discussed above.\textsuperscript{49}

I do not wish to put too much weight on such emotional connections, since they clearly do not accompany all instances of KH (or even most), and so they might well be unrelated to the general distinction between KH and KT. However, I believe that this phenomenon is worth mentioning given the many instances one finds of it in life and in popular culture. The movie \textit{Field of Dreams}, for example, revolves around the idea of a father teaching his son how to play baseball. The movie \textit{How to Make an American Quilt} focuses on a young woman bonding with her family while learning the craft of quilt-making. In \textit{On Golden Pond}, grandfather and grandson bond while the former teaches the latter how to fish. And in the film \textit{Grand Canyon}, an emotional epiphany occurs when a parent teaches a child how to make a left turn in Los Angeles traffic (at an intersection without a left turn arrow). There are many more examples like

\textsuperscript{48} Of course possessing some pieces of KT can be dangerous – e.g. knowing that a mob boss whacked someone could put you at considerable risk. Also \textit{applying} factual knowledge can be dangerous as well (e.g. mixing chemicals). But it is not the actual acquiring of such knowledge that is physically dangerous (as in the case of acquiring knowledge of how to ride a bicycle).

\textsuperscript{49} One candidate for KT that has some of these characteristics is learning about sex. Such knowledge is associated with danger (and, of course, pleasure), it expands one’s world (though again, mostly in a metaphorical way), and it tends to mark a dramatic life change. Yet I would argue that this knowledge still lacks the emotional resonance of the examples of KH listed above. People are much more likely to remember their first time applying such knowledge as opposed to acquiring it. Other candidates for instances of KT with emotional resonance might include: learning that there is no Santa Claus (or Easter Bunny, Tooth Fairy, etc.), learning that one was adopted, learning that one’s partner has been unfaithful, etc. I would nevertheless argue that the emotional associations in such cases are much different from those related to the KH examples listed above. In these KT examples it is not so much the acquisition of the knowledge that is emotionally-laden but rather the facts that are learned. With the KH examples, the opposite is true – it’s not so much the content of what’s learned that is important (as demonstrated by the immense variety of “coming of age” rituals across times and cultures), but rather the learning (and teaching) itself.
this, whereas similar sorts of examples of popular culture, in which the teaching and/or learning of facts or propositions take center stage, seem much harder to come by.

2.2.13 Language

In section 2.1.3, above, I noted that the philosophical literature on KH (and its relation to KT) focuses on linguistic considerations, such as analysis of knowledge ascriptions, and ignores the sort of experiential evidence I have been discussing in this section. While claiming that this focus is too narrow, I also noted that linguistic considerations are a legitimate piece of this puzzle. That is, I believe that linguistic data is relevant to developing an account of KH, but that it is not the only data that is relevant.

How do linguistic considerations relate to this discussion of “Folk KH”? Well, it seems plausible to see language as both reflecting our folk beliefs and influencing those beliefs as well. So analysis of language might help to elucidate Folk KH – indeed, I have often illustrated my claims above by invoking linguistic expressions (e.g. we often use the terms “book smart” and “street smart” to point to differences in aptitudes; expressions such as “don’t over-think it” seem to apply to KH but not KT, etc.). In this section, I will discuss some of the linguistic data that seems relevant to this discussion of Folk KH.

The most obvious bit of linguistic data to take into account is the different terminology we use to refer to knowledge (and knowers). We use “knowing that” (and various cognates) to refer to propositional knowledge, and “knowing how” (and various cognates) to refer to knowledge of skills and abilities. This suggests a belief in the existence of (at least) two different sorts of thing that both fall under the general category, “knowledge”; a belief that is consistent with the Distinction Hypothesis (DH).\(^{50}\)

\(^{50}\) Other languages appear to associate different words altogether for the two sorts of knowledge – a claim that philosophers such as Ian Rumfitt have discussed and which I consider in Chapter 5.
A second bit of evidence for DH that comes from consideration of linguistic practices was already referred to above (section 2.1.3). Consider the following sentences:

(1) Joe knows how to ride a bicycle  
(2) Sue knows that Albany is the capital of New York

These knowledge ascriptions seem different in that the object of knowledge in (1) is an activity while the object of knowledge in (2) is a proposition. This difference, again, suggests that there are (at least) two different sorts of knowledge with different sorts of objects, which is consistent with DH.

Consider some other linguistic data (some of which were also noted above) that supports DH. The following examples illustrate some ways in which knowledge-related expressions differ when applied to “how” and “that”:

(3a) Joe believes that Albany is the capital of New York  
(3b) Sue believes how to ride a bicycle  
(4a) Joe claimed that Albany is the capital of New York  
(4b) Sue claimed how to ride a bicycle

Both (3a) and (4a) are acceptable locutions while (3b) and (4b) are not.

There are, however, similarities in usage related to the two kinds of knowledge as well. As Ryle noted, we speak both of “learning how” and “learning that”; “finding out how” and “finding out that”, “forgetting how” and “forgetting that”, etc. But given the folk view that KH and KT are distinct, but that they are both types of knowledge (i.e. that they are both species that fall under the same genus), we should expect such similarities and differences.

The linguistic data referred to above relates to the relation of KH to KT. Philosophers have also employed linguistic considerations to investigate the nature of KH itself. For example, it might be thought that possessing KH is equivalent to possessing a skill or ability. However,

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51 The examples are adapted from examples in Chapter 2 of Ryle (1949).
52 Ryle (1949), Chapter 2.
this view appears problematic when one considers examples such as athletes who, through some tragic accident, lose the use of limbs.\textsuperscript{53} In such a case, the following might be a perfectly acceptable locution:

\begin{equation}
(5) \text{ Joe knows how to swim, but because he lost his legs in a tragic accident he is no longer able to swim. }
\end{equation}

Because this is a perfectly coherent claim to make, the argument goes, there must be more to KH than mere possession of a skill or ability.\textsuperscript{54}

On the face of it, then, consideration of ordinary language seems to generally support the folk theory of KH that has so far been developed. However, as I have noted above, Stanley and Williamson, in their 2001 article “Knowing How”, have made a strong case that the sort of linguistic evidence considered here is misleading, and that a thorough consideration of modern linguistic theories supports the view that KH is really a species of KT. In other words, Stanley and Williamson argue that DH is false, and they base this conclusion on linguistic data. I consider, and reject, their argument for this conclusion in Chapter 5 of this dissertation.\textsuperscript{55}

\subsection*{2.2.14 Summary}

From the above discussion, we can add some further items to our theory of Folk KH, so that it now looks as follows:

(a) the Distinction Hypothesis (DH);

\textsuperscript{53} Gruesome, for sure, but such examples are standard fare in the philosophical literature on this subject.

\textsuperscript{54} These sorts of arguments are suggestive, but they also demonstrate the shortcomings of relying solely on linguistic data in the investigation of KH. It can always be argued that the intuitions that underlie such linguistic claims are confused, or ambiguous, or not univocal, or that we need to make finer distinctions. For example, some have argued that we can describe Joe (from the above example) as “knowing how to swim with both legs” but not as “knowing how to swim without the possession of his legs” (or something to that effect). The above locution, then, gains assent because of an equivocation between these two senses of “knows how”.

\textsuperscript{55} Interestingly, Stanley and Williamson’s approach to this subject is similar to mine, but happens at a much smaller scale. That is, they begin with what we might call “folk” linguistic evidence related to KH and KT and subject it to the empirical scrutiny of modern linguistic theories. My project, however, is to begin with a general folk theory – one that takes a broad range of experiential and social considerations into account (including linguistic considerations) – and then consider it in light of a broad range of empirical data, from domains such as neuroscience, psychology and linguistics. Put another way, their project is a subset of the mine, which is why I note above that their conclusions are relevant but not the last word on the subject.
(b) the belief that KT can be acquired (demonstrated, taught) instantaneously (or at least relatively quickly) while acquiring KH takes time;
(c) the claim that acquisition of KT happens in discrete bits while acquisition of KH is continuous
(d) the belief that acquiring (demonstrating, teaching) KH requires rehearsal while acquiring KT does not (or, that they require different sorts of rehearsal);
(e) the belief that differences in propositions are quantitative while differences in skills and abilities are both quantitative and qualitative.
(f) the belief that acquiring (demonstrating, teaching) KH requires proprioception while acquiring KT does not;
(g) the belief that acquiring (demonstrating, teaching) KH requires a process that is very different from that required for acquiring (demonstrating, teaching) KT.
(h) the belief that there are widespread differences in aptitude regarding KH and KT;
(i) the belief that our educational institutions should take such aptitude differences described in (h) into consideration;
(j) the belief that the products of the two sorts of knowledge should be treated differently;
(k) the existence of different sorts of emotional associations with respect to the two sorts of knowledge;
(l) the existence of linguistic differences with respect to knowledge (and knowledge-related) terms

Again, this is not meant to be an exhaustive list – and not all of the above items have the same status. In particular, item (a) is closely related to many of the other items in that it (to some extent) both explains and is explained by them (for example, acquisition differences such as those referred to in (b) – (d) might contribute to the acceptance of (a), and in turn, acceptance of (a) might contribute to practices such as those mentioned in (i) and (j)). But the above list gives us a jumping off point in our investigation – we can now, for example, investigate whether or not it is empirically true that aptitudes tend to differ with respect to KH and KT; and whether or not the perceived differences in the various learning procedures (i.e. differences in acquiring KT and KH) reflect actual differences. Perhaps, like the belief that cold weather causes colds, these are merely bits of folk wisdom that do not hold up to close scrutiny. But they might find support upon further investigation and thereby help to decide among competing account of KH.
Additionally, this data places a burden of explanation on those who would argue that there is really only one kind of knowledge. Why, we might ask such a person, do these two kinds of knowledge seem so different, and have such different manifestations, if they are ultimately the same?

2.3 Complications

Folk theories, as a rule, are not neat, tidy consistent things, and so far I have been ignoring a number of complications that exist within the folk theory of KH. This is in part a result of focusing on paradigm cases of each kind of knowledge. When a broader range of cases is considered, however, complications (in the form of exceptions, vagueness, borderline cases, and inconsistencies) emerge. It is worth exploring some of these complications to get a better sense of what the complete folk theory looks like. Additionally, complications in the folk theory can guide the empirical research that follows by pointing to tensions or confusions regarding our intuitions. Such tensions and confusions might benefit from further investigation. Consider, for example, “folk physics” which includes inconsistent intuitions about speed and motion that ultimately led to distinguishing the notions of velocity and acceleration.56

Some complications, then, in no particular order:

2.3.1 Mixed Cases

Many, and perhaps most, examples of KH are really mixed cases – that is, they involve possession of both KH and KT. For example, when one knows how to ride a bicycle, one knows that one’s feet go on the pedals, that one faces forward, etc. Of course one need not know that those foot-thingies are called “pedals” or anything like that (or even that this contraption is called a “bicycle”), but one must nevertheless possess some specific bits of propositional knowledge in order to be said to know how to ride a bicycle. On the face of it, this “mixing” poses no problem

for DH or for our folk theory in general. After all, the claim that two things are distinct does not imply that they cannot mix. Hydrogen and oxygen, for example, are two distinct elements that nevertheless combine to form water (and hydrogen peroxide). And the sensory modalities are conceived of as distinct, but our visual and auditory systems (for example) continuously work together and interact with one another. However, if the two sorts of knowledge really are distinct, we should expect them to also be separable in certain ways. In Chapter 3, I will argue that neurological evidence regarding KH and KT gives us reason to believe that such separability does, in fact, exist.

Additionally, we might also expect to find symmetry with regard to this mixing. That is, we might expect to find that many cases of KT are also really mixed cases of both KH and KT as well. But this symmetry is not obvious. While it is certainly the case that acquiring various bits of KT requires some KH (e.g. learning that Albany is the capital of New York might require you to know how to understand or read some language), it is not clear that possessing knowledge of a particular proposition requires any specific bit of KH in the way described above.\footnote{Of course if one takes a behavioristic or dispositional approach to propositional knowledge – one in which “knowing X” involves behaving, or being disposed to behave, in certain ways – then cases of KT will involve KH. But this is by no means intuitive and thus it is a stretch to think of it as part of our folk theory.} This asymmetry is suggestive, and potentially significant. Perhaps it helps to motivate the view that KH is merely applied KT – a view that Ryle claimed was quite common among philosophers in 1949 when he wrote *The Concept of Mind*.\footnote{See especially Chapters 1 & 2 of that text for Ryle’s discussion of this view, which he calls the “intellectualist legend”.} This view might also be a minority view in Folk KH even now. That is, some might believe that knowing how to do something merely involves knowing a list of propositions – for example, knowing how to cook a dish is just knowing the recipe for that dish (and how to follow it). If that is indeed the case, then it would mark an
obvious inconsistency with Folk KH as I have outlined it above, since such a view would seem to clash with the Distinction Hypothesis.

A particularly interesting example of a mixed case is *knowing a language*. On the face of it, knowing a language (especially where that involves knowing how to read and/or speak the language) seems to require both KH and KT. To know a language, one must know *that* word $x$ has meaning $y$, for example, but one must also know *how* to pronounce words, write letters, put together sentences, etc. Chomsky famously resisted categorizing knowledge of language as KH, though he does not straightforwardly count it as KT either (he writes: “In general, it does not seem to me true that the concepts ‘knowing how’ and ‘knowing that’ constitute exhaustive categories for the analysis of knowledge”). Other philosophers, however, have thought knowing a language is a straightforward example of KH (e.g. Michael Devitt and Gilbert Harman). I do not intend to resolve this issue, but I do believe that the vast amount of empirical work that has been done on language can help to inform the debate about KH, KT and their relation to each other. I will consider it in later chapters, especially Chapter 6, where I present my own account of KH.

There do seem to be cases of “unmixed” KH, but such cases tend to be very simple activities or behaviors. For example, bodily knowledge such as knowing how to raise one’s arm, or knowing how to clear one’s throat might be seen as “pure” KH in that they do not require any propositional knowledge. Interestingly, these sorts of simple cases of KH appear at first glance to lack many of the characteristics associated with KH that I have listed above – such as the temporal element, the rehearsal element, the process element, etc. Perhaps we should take such

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59 See, for example, Chomsky (1998), especially pp. 9-12; also Chomsky (2006), in which he asserts that “knowledge of language is not a skill, a set of habits, or anything of the sort” (p. 169), and criticizes Gilbert Harman for claiming that knowledge of language is a type of KH.


simple instances of KH as standard rather than complex cases such as riding a bicycle. If we did so, many of the contrasts between KH and KT that I have catalogued would seem to disappear.

There are a few points to make in response to this issue of simplicity and complexity. First, I do not use these sorts of “pure” cases as a standard for KH for the simple reason that they are not standard cases of KH. When we look at the sorts of skills and abilities that are considered typical in our pre-theoretical consideration of KH, we find that it is the (relatively) complex ones, such as bicycle-riding, rather than the simple ones, such as throat-clearing. Given that these appear to be typical examples of KH, they make a good starting point for further investigation. Focusing on such paradigm cases is useful and efficient, since they are the ones that tend to incorporate the largest number of characteristics generally associated with KH. It might turn out, upon further investigation, that such paradigm cases are actually atypical in significant ways, and that our notion of “typical” needs to be adjusted. Nevertheless, until there is evidence for such a conclusion, it makes sense to stick with such cases as a model.

A second point about this simple/complex distinction that might make the above discussion moot is that it might not be the case that the examples of “pure KH” considered above really do lack the characteristics that I have catalogued. Anyone who has closely watched a young child in the first years of life has no doubt noticed that “simple” examples of bodily movements are not necessarily so simple when they are first being learned. Figuring out how to get one’s hand to go to a desired object, for example, is a struggle in the first few months of life; a struggle that takes time, proceeds according to a continuous process and requires proprioception. So it might be the case that such “simple” examples of KH only appear simple from our present vantage point, and so may not be as atypical as they seem at first glance.

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62 In fact, with many such examples of basic abilities, it sounds odd to even label them as KH (e.g. “I know how to clear my throat.”)
I may, however, be missing the real concern about simplicity and complexity. Perhaps the issue is about the inappropriateness of comparing a complex case of KH (knowing how to ride a bicycle) with a simple case of KT (knowing that Albany is the capital of New York). But again, I would respond that I chose what I took to be typical examples of each sort of knowledge, which is an appropriate starting point. It is to be hoped that further investigation will reveal if this is, ultimately, an appropriate conclusion. Furthermore, I have often drawn a contrast between knowledge of riding a bicycle and knowledge of all the state capitals – a much more complex instance of propositional knowledge. Many of the distinguishing characteristics of KH survive this comparison, in some form.

2.3.2 Non-Proprioceptive Examples of KH

There are a significant number of skills and abilities that are commonly thought to be instances of KH but which do not necessarily fit with the model I have been developing above. I am thinking especially of “mental” skills and abilities, such as the ability to reason logically, to concentrate, to do sums in one’s head, to translate a foreign language in one’s head, etc. Such skills and abilities obviously do not require proprioception. And having an aptitude for such skills and abilities seems less like having an aptitude for riding a bicycle, perhaps, and more like being good with KT.

What should we say about such cases? A number of possibilities suggest themselves. Perhaps these are simply exceptions to a general rule that otherwise holds good. Or perhaps we should think of KH as a “family resemblance”-type category, where membership involves meeting many or most of the criteria discussed above, but not necessarily all. Or perhaps this suggests that our taxonomy is too crude, and that we need to draw finer distinctions with respect to different kinds of knowledge. I believe that further empirical investigation will help us to
decide among these options, and I address some of them again in presenting my own account of KH.

2.3.3 Aptitudes

Another possible reason for thinking that our taxonomy might be a bit too crude arises when we think more about aptitudes. Above, I noted that we often distinguish aptitudes regarding KH and KT, but it is also typical to taxonomize aptitudes in a much more fine-grained manner. For example, an aptitude for music is often treated as a stand-alone aptitude (or, finer yet, an aptitude for a particular musical instrument, such as the piano), as are (to some degree) aptitudes for chess-playing, athletics (including individual sports), spelling, communication, dance, persuasion, etc. It might be the case that certain people have aptitudes with regard one or some of these activities without having a general KH-aptitude.

These further divisions might be explained in terms of specialization. That is, perhaps there is a general aptitude for KH (for these examples all seem to be instances of KH), but for personal and/or practical reasons individuals apply this general aptitude to specific activities. Also, this could be related to an observation made above – namely, that instances of KH are often qualitatively different from each other, whereas instances of KT differ only along a quantitative dimension.

These sorts of responses still leave us with a number of questions, however. Is there any evidence for a general aptitude for KH (or KT)? And can we draw finer distinctions regarding specific aptitudes that fall under the heading KT? That is, are there people with an aptitude for
learning certain kinds of propositional knowledge, but not others?\textsuperscript{63} Again, these are questions we should keep in mind (and that I will return to) as we pursue further empirical investigation.

\textbf{2.3.4 Linguistic Complications}

I have already mentioned one possible inconsistency with regard to the way we talk about KH – namely, that on the one hand, we talk about KH as if it involves competent performance of abilities and skills, and yet on the other hand, we can make sense of the notion that someone could possess KH yet lack the corresponding ability/skill (e.g. someone who knows how to swim, but because of a tragic accident, is no longer able to swim). There are some other complications related to linguistic conventions that are worth pointing out.

First, the expression “know how” (and its cognates) does not always pick out the sort of knowledge I have been describing. In fact, sometimes we use the “know how” locution to refer to knowledge that is straightforwardly propositional. For example, “I know how he did on his exam” means something like “I know that he received such-and-such a grade on his exam”. So not all instances of the term “know how” will pick out what I have been calling KH. It is generally possible to rule out these sorts of exceptions, though, if we limit ourselves to the locution “know how to”, which is much more likely to pick out the sorts of KH that I have been discussing.\textsuperscript{64}

A second, and related, point is that certain phenomena can be described in both KH and KT terms. For example, after learning the location of Albany, New York on a map, one might be described as \textit{knowing that} Albany, New York is at such-and-such a place, and one might be described as \textit{knowing how to} locate Albany, New York on a map. So we might well ask whether

\textsuperscript{63} Perhaps. We might think, for example, about students with an aptitude for history but not for biology. However, these sorts of examples are usually talked about in terms of preferences, favorites, or likes/dislikes, as opposed to aptitudes.

\textsuperscript{64} Exceptions might include sentences of the form “He knows how to get from point A to point B”.

there is any fact of the matter, here, as to whether such cases are actually instances of KH or KT – and if so, how to tell.\textsuperscript{65} It is not clear how widespread such cases are – that is, cases where either locution seems equally sensible and accurate. They seem to be limited to cases that involve very simple skills or abilities – it is not, for example, easy to see how “knowing how to ride a bicycle” could be re-described in terms of KT in a way that might actually be used in ordinary conversation. Anyway, this descriptive overlap at the lower level might suggest an actual overlap with the two kinds of knowledge at a certain level. Or it might suggest a blurry boundary at that level. Or it may just be a linguistic artifact with no wider significance to the concerns of this project.\textsuperscript{66} Again, further investigation might help settle the question.

2.3.5 Miscellaneous

There are a number of other miscellaneous concerns that might be raised with respect to the folk theory of KH that I have been considering. For example, while there are common stereotypes of “dumb mechanics” and “clumsy geniuses”, it is also the case that scientists and inventors get lumped together. The professor on \textit{Gilligan’s Island}, for example, not only had lots of factual knowledge but was also expected to know how to fix the radio when it broke. And it is often the case that “geniuses”, both in fiction and in real life, are expected to possess lots of knowledge of all types (which perhaps explains, in part, why Einstein was invited to be the first president of Israel).

Another question that comes up relates to young children and animals. A three-year-old child has normally learned many skills and abilities that she will remember (and that will serve

\textsuperscript{65} Those who believe that KH reduces to KT might tend to think that, as a general rule, instances of KH can be re-described in terms of KT. However I would contend that such a view is not part of our folk theory.

\textsuperscript{66} My daughter recently described a horse as “a unicorn without a horn”. The description was perfectly comprehensible to me, though that fact has no significance to the issue of the existence of unicorns. The point being that just because we can describe things in different ways, it does not mean we should necessarily put any metaphysical weight on such alternative descriptions.
However, much of the factual knowledge she acquires about specific people and episodes will be lost in a matter of years. We do not, after all, as older children and adults, directly remember the times when we were wearing diapers, meeting various relatives who have long since died, going to various places that no longer exist, etc. Is it part of our folk theory, then, that young children acquire KH but not (yet) KT? Or that they acquire and retain KH, but not KT? Possibly, and yet we do often describe children at such young ages as “knowing that such-and-such is the case”. I am certainly comfortable in saying things like: “my three-year-old son knows that Elmo is a character on Sesame Street”, and “he knows that our cats eat cat food”. And presumably these are things he will continue to know when her age is 5, 10, 18, etc. So it is not clear what our folk theory has to say about this subject (if anything).

A similar point can be made about animals. My cats have learned how to do lots of things – how to use the litter box, how to get my attention, how to open the door if it is ajar, etc. But do my cats have propositional knowledge? If we think of propositional knowledge as inherently linguistic, the answer seems to be a clear “no”, since animals lack the linguistic capacities of (most) humans. On the other hand, we often use the “know that” locution in talking about animals. For example, we say things like “my cats know that their litter box is in the basement” and “the squirrel knows that its food is stored in such-and-such a tree”, etc. So again, it is not clear what, if anything, our folk theory has to say about animal knowledge. Perhaps it is the case that KT is not inherently linguistic, according to our folk theory. Or perhaps the “knowing-that” locution is merely a façon de parler when applied to animals, in the same sort of way that intentional language is applied metaphorically to machines (e.g. “the computer thinks it
is the year 1901 because of the Y2K virus”). Or perhaps our folk theory contains inconsistent beliefs about such matters.67

The point, again, is not necessarily to resolve all of these issues and answer all of these questions. Rather, the point is to lay the groundwork for further investigation. Formulating the folk theory of KH (and its relation to KT) provides a jumping-off point. It gives us a set of beliefs that needs to be tested, and gets us thinking about where exactly to look for information and data that may help to provide solutions to some of our questions; and considering complications in the folk theory, as I have been doing in this section, helps to identify problem areas that need special attention. After all, the ultimate goal is to “fix” the folk theory to the extent possible, which involves resolving these sorts of outstanding issues.

With the beginnings of a folk theory in hand, then, and with these complications in mind, it is time to begin to search for some answers. In the next chapter, I begin that process by investigation what the neurosciences have had to say about this topic. Why the neurosciences? Well, a central belief in our folk theory of KH is the Distinction Hypothesis (DH) – i.e. the view that KH and KT are distinct kinds of knowledge. One source of evidence for or against this hypothesis could well come from the study of the brain. If the two sorts of knowledge are indeed separable, perhaps that fact is reflected in the organization and make-up of our brain. Neuroscientific evidence could thus inform the debate about DH, and it could also inform a number of other questions that have arisen regarding KH and KT – questions about the nature of the two kinds of knowledge (if indeed there are two kinds), and the acquisition of knowledge.

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67 It might be the case that we could address these concerns about children and animals by invoking the notion of tacit or implicit knowledge. I do address these notions and their relation to KH and KT in a later chapter. However, I do not believe that such notions really enter into our folk theory of KH and so I do not consider them in this chapter.
In later chapters, I will consider evidence from the fields of intelligence studies and developmental psychology to investigate questions about aptitudes; and I will also consider the domain of linguistics in order to investigate some of the questions that relate to language.
Chapter 3: Neuroscience and Knowing-How

3.1 Introduction

In the last chapter I presented the beginnings of a folk theory of knowing-how (KH). I noted that the folk theory is a good place to begin the process of investigating the nature of KH and its relation to other kinds of knowledge, but that it needs to be tested and scrutinized since its tenets are tentative and defeasible. In this chapter, I begin to evaluate some of the central beliefs of Folk KH – especially the Distinction Hypothesis (DH), which is the view that knowledge-how (KH) and knowledge-that (KT) are distinct kinds of knowledge.¹ Specifically, I consider recent findings in the neurosciences that relate to this hypothesis, and other aspects of the folk theory. I will argue that the evidence from the neurosciences does indeed support DH. In fact, neuroscientists in large part take such a distinction for granted nowadays and, so far as I can tell, remain unaware of the controversial nature of this claim among philosophers. Why do neuroscientists feel so sure about DH? The explanation for this attitude begins with the strange story of a man called Henry M.

3.2 Amnesia and Knowing-How

In the 2000 film Memento, the main character, Leonard Shelby, investigates the death of his wife and searches for her killer. His investigation is hampered by a medical condition – a form of amnesia – that stems from an injury suffered in the same brutal attack that led to his wife’s death. Now, Leonard’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, the protagonist suffers some traumatic injury

¹ By distinct kinds of knowledge, I am referring to the view that neither KH nor KT is identical with, reduces to, or is a species of, the other. So a view such as Stanley and Williamson’s, which holds KH to be a species of (or kind of) KT, would be inconsistent with DH.
(physical, emotional or both) and cannot 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, in *Memento* the protagonist has a form of amnesia that must strike most viewers as particularly outlandish – perhaps made up for dramatic purposes. With this form of amnesia, Leonard retains memories from before the traumatic event but cannot form new memories of things that happen after the injury. 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). For this reason, Leonard writes lots of notes to himself, some of which eventually become tattooed on his body. Leonard’s struggle to avenge his wife’s death under these circumstances – not to mention the fact that the movie runs in reverse, chronologically speaking – makes for an interesting and compelling story.² So its creators can perhaps be forgiven for inventing this far-fetched plot device of “reverse amnesia.”

Except, as you may have guessed, this condition was not invented out of whole cloth as a dramatic device. It is an actual medical condition called *anterograde amnesia*, which involves (again, crudely put) the ability to retain old memories but the inability to form new ones. A famous (among brain specialists) real-life example of this kind of amnesia is the case of Henry M. (who is often referred to as simply “H.M.”), whose anterograde amnesia was caused by a surgical procedure, a partial lobotomy, which was performed in Connecticut in 1953 to control Henry’s severe epileptic seizures. Henry’s case, described in more detail below, led neuroscientists to rethink almost everything they thought they knew about memory and

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² The film, directed by Christopher Nolan, does not run backwards in the sense of things moving in reverse, but rather runs backwards in the sense of the last scene (with respect to the movie’s chronology) happens first, the next-to-last scene happens second, etc. The scenes themselves run forward.
knowledge, and gave rise to the modern neuroscientific understanding of these related phenomena.³

Henry’s case, as noted above, is quite famous among neuroscientists. But it is difficult to find mention of it among philosophers.⁴ Yet Henry’s case is pregnant with philosophical implications. It raises questions about personal identity (e.g. is Henry the same person he was before the operation?), about ethics (e.g. can Henry be held morally responsible for his actions, given his condition?), and about memory and knowledge (e.g. what exactly is the connection between these two phenomena?). In this chapter, however, I will focus on the implications that Henry’s case has for the debate about KH/KT. I will argue that Henry’s case, and the scientific research that it led to, provide strong evidence for accepting DH (or some variant of it) and some other tenets of Folk KH discussed in the previous chapter. I will, in the next section, discuss the details of Henry’s case. In later sections, I will consider how Henry’s case informs the KH/KT debate, and how it relates to Folk KH.

3.2.1 The Strange Case of Henry M.

In 1953, the 27-year-old Henry M. underwent the neurosurgical procedure mentioned above, which was performed by Dr. William Scoville at Hartford Hospital in Connecticut.⁵ Henry was suffering from both minor and major (i.e. grand mal) epileptic seizures. The seizures had been becoming more frequent and severe to the extent that Henry could no longer work or live alone. No medicines or treatments were effective in controlling the seizures, and so

³ Henry M., we now know, was Henry Gustav Molaison – his identity was disclosed at his death in December, 2008 at the age of 82.
⁴ Actually, Henry does occasionally get mentioned by philosophers of mind, but not (to my knowledge) by epistemologists, and not in the context of the KH/KT debate.
⁵ I collected general information on Henry M., his condition, his surgery, etc. from a number of different sources ranging from his surgeon’s 1957 article (Scoville and Milner (1957)), in which he first published information on Henry M., to a biographical book about Henry (Hilts (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.
Scoville, with the consent of Henry and his family, decided to perform a “fractional lobotomy”.  

The surgery consisted of removing parts of Henry’s medial temporal lobes – a procedure which was experimental, but had been successful in reducing seizures in other patients. 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.

With respect to the seizures, the operation was a (relative) success. As Scoville and Milner pointed out in a 1957 article:

The incidence and severity of seizures in the epileptic patient [H.M.] were sharply reduced for the first year after the operation, and although he is once again having both major and minor attacks, these attacks no longer leave him stuporous, as they formerly did. It has therefore been possible to reduce his medication considerably.

However, the surgery also had a “striking and totally unexpected behavioural result: a grave loss of recent memory…” 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, pre-surgery events, or people that he had recently met (such as the hospital staff).

When it became apparent that Henry’s amnesia was not a short-term result of the surgery, Dr. Scoville 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 (H.M.) 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.

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6 Scoville and Milner’s terminology – see Scoville and Milner (1957), p. 11.
7 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.
8 Scoville and Milner (1957), p. 12.
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 (both KH and KT) acquired before the surgery – knowledge that his name was Henry, for example, knowledge of how to speak and write English, knowledge that he was from Connecticut, and knowledge of how to walk and control his body. Additionally, Henry 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\(^\text{11}\)), 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, remembering the night of one’s senior prom, 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.

There are some exceptions to the above claims. Henry can acquire bits and pieces of new semantic knowledge – for example he can sometimes identify names that have become well-

known since his surgery if given parts of the name or descriptions.\textsuperscript{12} For instance, if he is cued with Martin L.K. he will guess that it refers to Martin Luther King, Jr. Additionally, Henry could draw a floor plan for a house he had moved into after his surgery. He retained a memory of this floor plan for years, even after he had moved out of the house.\textsuperscript{13} Such exceptions are sometimes attributed to minor remnants of Henry’s medial temporal lobes that survived the surgery; or, as in the case of remembering the floor plan of his house, attributed to other parts of the brain (retained by Henry) that might be partially responsible for certain kinds of memories – parts of the brain which Henry retains. In general, though, Henry has been unable to acquire much in the way of new episodic or semantic memories since his surgery.

Further study of Henry has been done over the years since his surgery (quite a lot of it, actually\textsuperscript{14}), 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”.\textsuperscript{15} Corkin, a cognitive scientist 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).”\textsuperscript{16} In short, it seems fair to describe Henry as being unable to acquire new propositional knowledge.

\subsection*{3.2.2 Henry and Knowledge—How}

\begin{itemize}
\item \textsuperscript{12} Corkin (2002), p. 158.
\item \textsuperscript{13} Ibid, p. 155-6.
\item \textsuperscript{14} Corkin estimates that over 100 investigators have poked and prodded H.M. since his condition arose in 1953. Ibid, p. 153.
\item \textsuperscript{15} Schaffhausen (2004), p 1.
\item \textsuperscript{16} Corkin (2002), p. 153.
\end{itemize}
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.”¹⁷ That is, Henry can acquire new procedural knowledge, or KH. 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 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.¹⁸

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. Put another way, 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.

The mirror-drawing experiments were performed on Henry in 1959 (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.” Corkin set out to test this hypothesis further.

Corkin’s tests involved evaluating Henry’s performance on three new (for him) motor-learning tasks. One task, referred to as Rotary Pursuit, involved placing the point of a stylus (a pencil-like tool) against a particular spot on a metal disk and then holding it there as the disk began to rotate. A second task, called Bimanual Tracking, involved holding two styluses, one in each hand (simultaneously), against shifting tracks on a rotating drum. The third task, referred to as Tapping, involved using a stylus to tap numbered segments of a circle in sequence. This last task was performed with each hand separately and then with both hands together. Two control tasks measured reaction time and the ability to serially order a list of digits.

Though Henry’s scores on such procedures were lower than those of the control group, Corkin nevertheless reported that:

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.”

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. Henry clearly expands cognitive effort during his sessions – for example, in avoiding errors made in previous attempts (hence the description of him as learning, rather than merely imitating). The effort expended

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20 Corkin (1968), pp. 257.
21 Though attempts to reproduce H.M.’s mastery of the Tower of Hanoi Puzzle have met with mixed results. See Xu and Corkin (2001).
leads to improvement in his performance, which is retained over long periods of time. On the other hand, there is a lack of knowledge with respect to the details of the testing sessions, and a lack of any memory of (or even feel of familiarity about) doing the tasks previously. In short, it appears that at first glance we can ascribe to Henry the ability to acquire KH in the absence of the ability to acquire KT.

3.2.3 Generalizing H.M.’s Results

So it seems that Henry can acquire new KH but cannot acquire new KT. This, in turn, appears to support the suggestion that KT and KH are distinct, though related, kinds of knowledge. The reasoning underlying this conclusion goes as follows:

P1) Henry’s condition has rendered him unable to form new memories of a certain sort.

P2) This, in turn, has rendered Henry unable to acquire new propositional knowledge, or KT.

P3) Henry is nevertheless able to learn and remember how to perform certain skills – as reflected in his ability to improve his performance over time with regard to these skills.

P4) Thus, Henry is able to acquire new KH.

P5) If Henry can acquire new KH but cannot acquire new KT, then KH and KT must be distinct kinds of knowledge.

C) KH and KT are distinct kinds of knowledge.

This argument depends both on empirical premises about Henry’s condition as well as on conceptual premises regarding the relationship between knowledge and memory. The empirical premises of the argument, P1 and P3, are strongly supported by the research described above. And the relationship between knowledge and memory, as well as some other potential challenges to this argument, will be addressed below. First, I want to briefly address questions about the extent to which Henry’s condition is generalizable (as opposed to idiosyncratic).

Obviously, the conclusion of the above argument would be strengthened if Henry’s results could be generalized. For, while Henry’s condition shows that KH and KT are, in
principle, dissociable, it is always possible that Henry’s situation is idiosyncratic in some way (or ways) and thus not representative of the relation between KH, KT and the structures of the brain.

One problem with attempting to draw general conclusions from H.M.’s condition, however, is due to the uniqueness of his circumstances. Henry’s surgeon, Dr. Scoville, performed the same procedure that led to Henry’s amnesia on a number of other patients – 29 others to be exact. The problem is that all of the other patients that Dr. Scoville operated on in this manner were psychotic, and:

“Testing” after lobotomies was so crude when done on severely schizophrenic patients that even an utter loss of the ability to form memories often went unnoticed. Of the other twenty-nine, only one patient, a forty-seven-year-old doctor who was schizophrenic, tested out clearly enough to say that he had a profound loss of memory from his operation, which was somewhat less severe than H.M.’s.  

And after discovering what happened to Henry, Dr. Scoville warned other doctors against such surgeries.

Henry is, then, unique in significant ways. He seems to be one of the few patients to have undergone this particular surgical procedure who then (because of the absence of severe mental illness) clearly manifested its effects on memory and learning. Furthermore, the nature of the procedure was such that its effects would not be readily duplicated in non-surgical ways. In other words, a head injury in a car crash, or getting hit by a bolt of lightning, etc. were unlikely to cause the kind of damage that Henry had been subject to with this surgery. Nevertheless, while Henry’s condition is unique, there are those with conditions similar enough to Henry’s, and that enabled neuroscientists to develop novel theories of, and draw general conclusions about, memory, learning and knowledge from such cases. Additionally, scientists used animal experiments, as well as experiments on normal (i.e. non-injured) subjects to support these conclusions.

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3.2.4 Other Amnesics

While Henry’s circumstances are unusual, his condition is not unprecedented. Others have experienced anterograde amnesia. Additionally, others have displayed specific symptoms which are similar, in relevant ways, to Henry’s but which were caused by a variety of different circumstances. Some diseases cause brain damage similar to that suffered by Henry (e.g. Korsakov’s syndrome, which is caused by alcoholism). Sometimes it is the treatment of disease (e.g. removing cancerous parts of the brain) that causes the damage. Some such examples are discussed below, followed by a consideration of the theoretical work that has arisen as the result of such cases.

Greg F. suffered brain damage caused by a tumor that, while benign (and subsequently removed), had caused harm to his brain as it expanded to the size of a “small grapefruit or orange”. Greg’s tumor had “compressed or destroyed structures of the inner, or medial, side of both the temporal lobes – in particular, the hippocampus and its adjacent cortex areas crucial for the capacity to form new memories.” Greg’s condition was similar to Henry’s – he was unable to form new episodic or semantic memories after the damage had been done (though he retained such memories acquired before the tumor), but he was able to acquire and retain procedural memories, albeit unconsciously. Neurologist, Oliver Sacks reported that Greg, “…not only retained his power to play the guitar, but actually enlarged his musical repertoire, learning new techniques and fingering…He also learned to type while at Williamsbridge [Hospital] – so his procedural memory was also unimpaired.”

In the same essay, Sacks recalls a patient he had observed in England, “a musicologist with profound amnesia from a temporal lobe encephalitis, unable to remember events or facts for

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24 Ibid, p. 53.
more than a few seconds, but able to remember, and indeed to learn, elaborate musical pieces, to conduct them, to perform them, and even to improvise at the organ.”

Another condition (noted above) that causes amnesia similar to that exhibited by Henry is called Korsakov’s Syndrome – named for the 19th century Russian doctor who discovered it. Korsakov’s Syndrome arises from brain damage usually caused by excessive alcohol consumption. As a result, “memory of recent events is disturbed almost exclusively; recent impressions apparently disappear soonest, whereas impressions of long-ago are recalled properly, so that the patient’s ingenuity, his sharpness of wit, and his resourcefulness remain largely unaffected.” Korsakov’s sufferers display the same deficit with regard to episodic and semantic memories that Henry displays, but nevertheless retain the ability to acquire new skills. In fact, the tests that revealed this asymmetry in Henry often included participants suffering from Korsakov’s Syndrome, who usually performed similarly. According to neuroscientists Neal J. Cohen and Howard Eichenbaum, “…the amnesia associated with Korsakoff’s disease has received intense scrutiny – more so than any other etiology of amnesia – and has been found to exhibit this type of selectivity [displayed by H.M.].”

Additionally, Cohen and Eichenbaum, who have pioneered much of this research, note that neuropsychologists have found a double dissociation between skill learning and [propositional] recall and recognition. Diseases such as Alzheimer’s and Parkinson’s often preserve declarative memory while damaging sufferers’ ability to acquire certain kinds of KH.

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26 Ibid, p. 65. The patient Sacks is describing here is Clive Wearing, whose case has been documented in a number of other sources, and who is the subject of a documentary film called The Man With the 7 Second Memory. Sacks discussed Wearing again in his more recent book, Sacks (2007), on music and the brain.

27 Korsakov’s Syndrome (also spelled Korsakoff’s Syndrome and sometimes called Korsakov’s – or Korsakoff’s – Psychosis) does not affect the hippocampus, as in H.M.’s case. Rather, it affects the mammillary bodies, which are in the frontal lobe. However, there are strong connections between the mammillary bodies and the hippocampus, and both are part of the brain’s limbic system.


29 See, for example, Cohen and Squire (1980).

This, too, provides “strong evidence for claiming a distinction between the cognitive processes or systems mediating the dissociated categories of performance.”

### 3.2.5 Animal Studies

Based on evidence from amnesia patients such as that described above, new theories of memory began to arise. Whereas in the past memory had often been conceived of as a somewhat unitary phenomenon, it was now becoming apparent that there were different kinds of memory and that these different kinds of memory had different neural substrates. Henry’s case, and others like it, seemed to show that the hippocampal system is necessary for certain kinds of memory (i.e. episodic and semantic), but not others (i.e. short-term and procedural). To test such theories, animal studies were done. These experiments – I will describe a few of them briefly below – provided further support for such theories and in doing so provided further support for the view that KH and KT are indeed distinct kinds of knowledge.

One experiment, done with rats, involved the task of escaping from a water maze. The experiment:

...uses a 2-meter diameter circular tank (or pool) filled with opaque fluid (milk or colored water) and an escape platform slightly submerged under the water surface at a constant location relative to various extramaze visual cues. In the standard version of the task, the rat is placed into the tank at various locations around the circumference of the pool on successive trials. The animal swims around until it finds the platform and can escape from the water.

The experiment was performed on both normal, healthy rats as well as rats with hippocampal system damage. Normal rats “come to locate the platform increasingly rapidly, and eventually

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32 The following information on animal experiments and studies comes from Cohen and Eichenbaum (1993), Chapter 7.
learn the spatial location of the platform sufficiently well to permit them to navigate directly to it from any start location.”  

The impaired rats, however, behaved differently:

Hippocampal system damage has been found to impair the ability to learn the location of the escape platform. Placed into the pool at various starting positions, rats with hippocampal system damage are not able to swim directly to the platform, instead being forced to search exhaustively for its location each time, with the result that their escape latencies are abnormally long.

We might, then, describe the impaired rats as being unable to acquire a certain item of KT – namely, knowledge that the platform was located at such-and-such a location. However, “(d)espite their profound impairment on the task…animals with hippocampal system damage do become efficient swimmers and do learn to climb up onto the platform (and thereby escape from the water) when they finally locate one.” Furthermore, these impaired animals demonstrate the ability to learn and retain the procedures of the task, and to generate and use adaptive strategies. “This pattern of impairment and sparing,” Cohen and Eichenbaum conclude, “seems to have the very same form as that seen in human amnesia.”

Cohen and Eichenbaum also describe radial maze experiments (where the maze has a central space with a number of arms radiating outwards – like a starfish), in which rats with hippocampal system damage are impaired with respect to remembering the locations of food rewards and yet still “successfully learn and retain the procedures of the task” and generally show the same “pattern of impairment and sparing seen in the other tasks we have considered.”

A third kind of experiment done on rats involves a number of related tasks referred to as “conditional discrimination tasks”. In such tasks, the animals have to make certain associations in order to obtain a food reward. For example, in one experiment of this kind, the rats “have to learn that presentation of a tone stimulus is followed by a food reward…only when it is preceded

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36 Ibid, p. 162.
by presentation of a visual stimulus”; and in another such task, “a tone or light signifies the
availability of reward but the combination of tone plus light signifies the absence of reward.”
Again, normal rats learn the associations quickly while those with hippocampal system damage
were impaired. But again, despite their impairment, these rats were “nonetheless capable of
learning and remembering the task procedures” and “the pattern of impairment and sparing
seems to take the same form as in human amnesia.”

Experiments with monkeys with hippocampal system damage “also suggest the ability to
learn skills despite amnesia” and Cohen and Eichenbaum draw the general conclusion that
hippocampal system damage in general, and across species, inhibits or prevents the acquisition
of declarative and semantic knowledge (i.e. KT) but leaves intact, to a large extent, the ability to
acquire new skills or abilities (i.e. KH).

3.3 Scientific Conclusions

Henry’s condition, then, does not appear to be idiosyncratic. Damage to the hippocampal
system generally inhibits the ability to acquire episodic and semantic knowledge (together
referred to as declarative knowledge) while leaving intact the ability to acquire procedural
knowledge. Therefore, we can generalize the argument above, which was specifically about

Henry:

P1) Damage to the hippocampal system leads to the inability to form new
memories of certain sort.
P2) This, in turn, inhibits the ability to acquire new propositional knowledge, or
KT.\footnote{Cohen and Eichenbaum (1993), p. 165.}
P3) Nevertheless hippocampal system damage spares the ability to form new
procedural memories

\footnote{Ibid, p. 167.}
\footnote{Ibid, pp. 149-153, 185}
\footnote{There are complicating factors that Cohen and Eichenbaum discuss in their book. In general, though, the authors
are confident that apparent discrepancies in the data can be accommodated within their theory.}
\footnote{I am assuming, here, that possessing propositional knowledge involves long-term storage of the proposition
known. More on this in the section on memory, below (3.5.1)
P4) Thus, those with such damage are able to acquire new KH.
P5) If it is possible for individuals to acquire new KH but not to acquire and new
   KT, then KH and KT must be distinct kind of knowledge.

C) KH and KT are distinct kinds of knowledge.

Other evidence for the claim that Henry’s condition is not idiosyncratic is the fact that study of
Henry ultimately led scientists to develop new theories of memory. The kinds of studies and
experiments described above – which tested the abilities of Henry and other amnesic patients –
made it difficult, if not impossible, to preserve a unitary theory of memory, and those who tried
encountered severe difficulties.\(^{42}\) For those who came to accept the notion of multiple kinds of
memory, however, questions arose with respect to why certain kinds of memories would be
associated with the hippocampal system and why others would not. Cohen and Eichenbaum
suggested that it had to do with the kinds of representations that were required for the various
kinds of memories. They summarize their view as follows:

\[
\ldots \text{the hippocampal-dependent declarative memory system supports a relational form of}
\text{representation exhibiting the critical property of flexibility, capable of being accessed and}
\text{expressed in novel contexts; whereas procedural memory, operating independently of the}
\text{hippocampal system, supports a fundamentally inflexible form of representation that can}
\text{be expressed only in virtual repetitions of the initial learning situation.}^{43}\text{ (emphasis in}
\text{original)}
\]

The hippocampal system supports these kinds of memories, Cohen and Eichenbaum
suggest, because the hippocampal system is massively interconnected with other brain modules –
including modules that govern sensory apparatus and higher cognitive functions. The
connections, it should be noted, go both ways. Information comes into the hippocampal system

\(^{42}\) It was argued, for example, that tasks that amnesics did well on were simply “more sensitive to the presence of
memory”. Such unitary theories “assign the selectivity of amnesia to differences among tasks in their ability to
provide access to the contents of that single memory store” (Cohen and Eichenbaum (1993), pp. 45-6). Such
theories are contradicted by other types of memory impairment with inverse effects relative to the same tasks.
Patients suffering from Parkinson’s disease and Huntington’s disease, for example, are “reported to have a
disproportionate deficit in skill learning” (Ibid, p. 47).

\(^{43}\) Ibid, p. 49.
from these other modules and also goes back out from the hippocampal system. Because of 
these connections:

…Activation of any given declarative memory…gives rise to activation of other related 
memories…revealing or producing all manner of relations among the stored 
items…(T)he full interconnectedness of such a representational system produces the 
ability of information to be activated regardless of the current context, by all manner of 
external sensory or even purely internal inputs.44

This interconnectedness explains why declarative memories are the way that they are. One can, 
for example, learn a word in one context but then apply it in a totally new situation. One can 
consider a tree that one saw yesterday and imagine what it will look like when its leaves change 
and start to fall.

Procedural memories, on the other hand, lack this flexibility and connectedness. This is 
due to their neurological characteristics. For procedural memories:

Their storage resides within and remains inextricably tied to the processing modules that 
were engaged during initial learning. This type of memory involves not the storage of 
outcomes of processing operations, but rather tuning of and changes in the way those 
operations actually run – that is, modification of the processing elements themselves. 
This type of representation is therefore inflexible; it is only accessible to those processing 
modules that were engaged during the original learning experiences, and only when they 
are again engaged. The representations therefore can only be expressed or otherwise 
exert their influence under testing conditions that so closely mirror the circumstances of 
original learning – from the perspective of the processors engaged by the task – as to 
constitute a repetition of the original learning situation.45

In other words, the memories associated with procedures are specific, and not to any large extent 
portable and applicable to new situations. So while my semantic memory of learning a new 
word allows me to apply that word in a wide variety of different contexts; and while my episodic 
memory of the tree I saw this morning can be recalled and manipulated in any number of ways; 
my procedural memory of how to ride a bicycle is not going to get me very far in any other 
context except riding a bicycle (or doing something that is, physically, very similar).

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45 Ibid, p. 74
The reason for this, it seems, is that while declarative knowledge is always tied to the hippocampal system in the brain, procedural knowledge lacks this homogenous connection. As Larry Squires and Stuart Zola, both prominent neuroscientists doing research in this area, point out:

Whereas declarative memory is a brain-systems construct, tied to the brain structures and connections damaged in amnesia, non-declarative memory refers to a heterogeneous collection of several kinds of memory that in turn depend on distinct brain systems. Thus, classical conditioning of skeletal musculature depends on the cerebellum, conditioning of emotional responses depends on the amygdala, and habit learning (win-stay, lose-shift responding) depends on the neostriatum.

This is a very brief and narrow overview of the current state of affairs with respect to neuroscientific views about memory and knowledge. I have relied heavily on Cohen and Eichenbaum’s account because their focus is most closely related to my own. However, while differences remain with respect to important details and terminology, there seems to be general agreement about the central issues with regard to the neurobiology of memory: that is, memory is managed and instantiated in multiple neural substrates and that declarative memory has a different neurobiology than procedural memory. For example, in a recent book neuroscientist (and Nobel laureate) Eric R. Kandel writes:

…in 1962 [Brenda Milner – working with Henry M.] demonstrated another principle of the biological basis of memory – the existence of more than one kind of memory. Specifically, Milner found that in addition to conscious memory which requires the hippocampus, there is an unconscious memory that resides outside the hippocampus and the medial temporal lobe…Milner thus demonstrated this distinction by showing that the two forms of memory require different anatomical systems…The ability to learn a drawing skill…and other learning abilities described by Milner proved to be remarkably general and applied equally well to other people with damage to the hippocampus and the medial temporal lobe.

Also, Squires and Zola note that:

An important finding of neuropsychological studies of memory is that medial temporal

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lobe damage affects only one kind of memory. This finding, and others, led to the idea that memory is not a single entity but is composed of several separate systems. The kind of memory impaired in amnesia has been termed declarative or explicit memory. Non-declarative (or implicit) memory is unaffected. (The term 'procedural' has also been used to describe some kinds of non-declarative memory, particularly skill learning.)

3.4 Neuroscience and Folk KH

On the face of it, then, the neuroscientific evidence described above provides support for a number of beliefs that are central to the folk theory of KH, discussed in Chapter 2. Most significantly, this evidence provides support for the Distinction Hypothesis (DH), by suggesting distinct neural substrates (or, in Kandel’s words above “different anatomical systems”) for KH and KT. I do not mean this argument as definitive proof of DH, but rather as an inference to the best explanation type argument. That is, the fact that the KH and KT are based in different neural systems is strong evidence for the conclusion that they are different kinds of knowledge altogether, rather than one being a species of (or reducible to) the other. And at the very least, it puts a burden on those who would advocate such a priority relation between the two types of knowledge to explain away this neurological evidence.

Support for DH in turn provides support for some of the other tenets of Folk KH. For instance, given that the different kinds of knowledge depend upon different neural substrates, it should not be surprising that there would be individual differences with respect to the two kinds of knowledge, since there will no doubt be individual differences with respect to the development of these substrates. Thus we should expect aptitudes to vary from person to person. Additionally, given that the two sorts of knowledge are associated with distinct neural substrates, we should expect the processes by which each kind of knowledge are acquired to differ as well.

Moreover, the most prominent theory developed to explain the difference between declarative and procedural memory/knowledge lends support to some other tenets of Folk KH.

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Recall Cohen and Eichenbaum’s claim that the hippocampal system, which is key to declarative memory, is elaborately interconnected with other modules of the brain. This gives declarative memories (and knowledge) a “flexibility” such that they can be applied to new situations, considered under different circumstances, integrated with other information, etc. Procedural memories, on the other hand, are relatively inflexible, meaning they can only be applied in circumstances similar to the ones in which they were originally acquired. This can help to explain why acquisition of KH requires repetition of the same task over and over again, and why methods of acquisition of different kinds of KH are qualitatively different and non-transferable to other kinds of KH (i.e. you cannot learn how to drive by riding a bicycle). Whereas different bits of KT, while quantitatively different, can be acquired using much the same methods (e.g. books, classrooms, notecards, etc.), whether they involve propositions about mathematics, literature, geography or astronomy.  

A related point: the claim that declarative knowledge invariably depends upon the hippocampal system, while procedural knowledge has roots in a variety of different brain systems, provides support for the folk theoretical observation that bits of KT tend to differ along quantitative dimensions while bits of KH often differ in qualitative ways. These qualitative differences might be explained by the heterogeneity of brain systems that underlie procedural knowledge. This heterogeneity of KH might also explain the observation that aptitudes for different sorts of KH can vary from individual to individual while aptitudes for KT seem less variable.

The evidence from the neurosciences, then, might well support a more fine-grained taxonomy of knowledge than a simple KH/KT divide. This in turn would help to resolve some

49 See sections 2.2.6 & 2.2.7 in Chapter 2 for discussion of this point.
50 See section 2.2.1 in Chapter 2 for discussion of this point.
of the complications that arose with respect to the folk theory of KH. So far, we have been considering a taxonomy that looks something like this:

But perhaps a better representation of how knowledge is organized would look something like this:

Where W, X, Y and Z might stand for different types of skills and abilities, perhaps those in which we find varying individual aptitudes – for example, chess playing, playing a musical instrument, mechanical abilities and athletic abilities. This possibility will be picked up and explored in the next chapter, where questions of aptitudes are investigated in more detail.
3.5 Philosophical Questions

While neuroscientists might agree that: “…experimental findings provide evidence that such a distinction [i.e. “the classical distinction between knowing-how and knowing-that”] is honored by the nervous system”\(^{51}\), it does not necessarily follow that the philosophical issues are settled (or even affected) by such claims. There are a few philosophical concerns that should be addressed before the scientific conclusions can be said to inform the philosophical debate about knowing-how (KH) and knowing-that (KT). Above, I provided an argument for the distinction between KH and KT:

P1) Damage to the hippocampal system leads to the inability to form new memories of certain sort.
P2) This, in turn, inhibits the ability to acquire new propositional knowledge, or KT.
P3) Nevertheless hippocampal system damage spares the ability to form new procedural memories
P4) Thus, those with such damage are able to acquire new KH.
P5) If it is possible for individuals to acquire new KH but not to acquire new KT, then KH and KT must be distinct kind of knowledge.
C) KH and KT are distinct kinds of knowledge.

One key issue that is relevant to a number of the above premises involves the relationship between memory and knowledge. The neuroscientific literature shifts unproblematically between these two notions – assuming, so it seems, that conclusions drawn from memory studies can be applied to questions about knowledge. Another (related) issue involves the question as to whether scientists and philosophers are using the same terms to mean the same things. Put another way, perhaps the philosophical notion of “knowledge-that” is so dissimilar from the neurological notion of “declarative knowledge” that it is misleading to draw conclusions about one from data about the other. I will address these two concerns briefly below before considering other possible objections to this argument.

3.5.1 The Connection between Knowledge and Memory

Surprisingly little has been written by philosophers about memory and even less so with respect to the relation between memory and knowledge. The standard view of knowledge as justified true belief\(^\text{52}\) seems to ignore the question of what role memory plays in knowledge, though it seems plausible to assume that memory could figure into this account in a number of ways. First, it could be argued that if one has no memory of something, then one cannot be said to believe it. Someone like Henry, for example, cannot remember his doctors’ names and so cannot be said to have beliefs about what his doctors’ names are. More generally speaking, it seems as if Henry has no (or few) beliefs with respect to post-traumatic experiences and events. If that is the case, it seems unproblematic to conclude that he lacks propositional knowledge about such things.

It might be argued that one could have beliefs even if one lacked memories of how one came to have those beliefs. And that seems true – I believe that Reykjavik is the capital of Iceland, though I cannot remember who told me that or how exactly I came to have that belief. However, in Henry’s case, it is not a matter of how he came to have the beliefs he has that is of concern. Rather, it is that Henry generally lacks beliefs about post-traumatic things, events and experiences. And if he has no beliefs, then he cannot be said to have knowledge.\(^\text{53}\)

A second way that memory could fit into the justified-true-belief account of knowledge is with respect to the justification aspect. Again, if one cannot form any memories of things, events and experiences then it is difficult to see how beliefs about those things, events and experiences

\(^{52}\) Or as “justified-true-belief plus”, where the “plus” is whatever is required in order to avoid Gettier-type problems.

\(^{53}\) It has been suggested to me that someone might argue that Henry really does have beliefs (some of which could be justified, true beliefs) but that he is unable to access them. Perhaps if Henry were hypnotized, for example, he’d be able to remember lots of stuff that he is unable to recall normally. While there may be some cases in which memory loss is temporary and reversible, Henry (and other hippocampal-damaged patients) do not fit that description – or at least, none of the doctors or scientists who have contributed to this literature have suggested such a possibility. I discuss this possibility further in Section 3.5.3 below.
could be justified. Again, it is possible to have beliefs that could be justified even in the absence of specific memories (e.g. my Reykjavik example above). But my knowledge of this fact is based on some non-specific memories – such as the memory of taking geography classes, the memory of seeing news stories about Reykjavik, etc. If I completely lack such memories – that is, if I lacked any memory of how or from where a belief was obtained – it is not clear that it would be accurate to say that I was justified in believing it. Robert Audi makes a similar argument, in what might be read as an allusion to Henry’s situation (though there is no specific mention of Henry):

Memory is…a basic source of justification. Both memory and perception…are to be causally conceived, and both are, in different ways, sources of belief, justification, and knowledge…. Without [memory] perceptual knowledge could not be amassed and used to help us build theories of the world or of human experience, or even to make local maps to guide daily living. We would not even have a sense of who we are, since each moment would be dead to us by the next. Beyond this, memory is a basic source of justification. That is a vitally important epistemological point. And as we shall see, the role of memory in our knowledge in general is also of enormous epistemological importance.54

It seems, then, that memory is essential to propositional knowledge and that the inference from Henry’s inability to form memories to his inability to acquire propositional knowledge is unproblematic. Such a conclusion not only squares with philosophical views about knowledge but also with our commonsense intuitions. While intuitively, it makes sense to say things such as “I know the answer but I can’t remember it”, there comes a point at which inability to remember is a strong indicator of lack of knowledge. Also, consider that locutions such as “I used to know that but I can no longer remember it”, or expressions such as “In her lifetime, she’s forgotten more than you’ll ever know”. Clearly the link between memory and knowledge is, as Audi puts it, “of enormous epistemological importance.”

3.5.2 Are We All Talking about the Same Things?

A related question of some concern is whether or not the philosophical concepts of KH and KT do in fact track with the neuroscientific concepts of declarative and procedural knowledge. Does it really follow from Henry’s inability to acquire declarative knowledge and his corresponding ability to acquire procedural knowledge that he can acquire KH but not KT? Or are the concepts so different that such a conclusion is implausible?

First, it should be noted that the neuroscientific terminology is not uniform. Some neuroscientists tend to use the broader categories of ‘implicit’ and ‘explicit’ memory/knowledge in order to encompass all of what is preserved in amnesics with hippocampal system damage. Nevertheless, most neuroscientists use the concepts of procedural memory and declarative memory (which includes both semantic and episodic memory) as basically equivalent to the philosophical notions of KH and KT. Are they in fact equivalent?

The answer is a qualified “yes”. One qualification is that, as noted above (and as I demonstrate in some detail elsewhere), not much philosophical work has gone into analyzing the concept of KH, so there is nothing like “the” philosophical account of KH. Those who have devoted some time to KH, though, tend to characterize it in much the same way that neuroscientists characterize procedural knowledge. Recall some of the characteristics that Cohen and Eichenbaum apply to procedural memory/knowledge: inflexible, can only be expressed in repetition, and under conditions similar to the learning conditions, and often implicit. Kandel uses similar descriptions. He notes that implicit memory has an “automatic” quality and that it is “reflexive” and comes from “constant repetition”. Neuroscientists also emphasize, of course,

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55 For example, Henry and other amnesics often retain short-term memory, as well as the ability to perform non-motor skills, and the ability to learn some tasks via classical conditioning. Since these all tend to rely on non-conscious processes, they are sometimes grouped together under the heading “unconscious” or “implicit” memory/knowledge and contrasted with “conscious” or “explicit” memory/knowledge.

56 See the Cohen and Squire quote at the beginning of Section 3.5 above.

that procedural memory/knowledge involves memory/knowledge of a procedure even in the absence of any corresponding memory/knowledge of the explicit rules that govern the procedure. This for the most part is consistent with how philosophers characterize KH, so it is not surprising that neuroscientists often make the connection between their findings and these philosophical categories. Cohen and Squire, as noted above, specifically invoke this “classical distinction” and many of the scientific articles refer to Ryle’s work on KH and KT, even if only in a footnote. Kandel, for example, mentions Ryle and notes (a bit misleadingly) that he distinguished between knowing how (the knowledge of skills), and knowing what (knowledge of facts and events)."\(^58\)

Of course it is always possible that they are wrong. It would not be the first time that scientists misconstrued philosophers. But this does not seem to be the case. For one thing, procedural knowledge is primarily associated with skills and abilities, as is KH. For another, paradigm cases of procedural knowledge tend to be the same kinds of examples that philosophers give for KH (e.g. riding a bicycle, swimming, etc.). This suggests that neuroscientists and philosophers at least agree, in general, about the subject matter. Furthermore, as noted in Section 3.2.7 above, there is much overlap with respect to the neuroscientific conception of procedural knowledge and our general conception of KH. Most significantly, neuroscientists emphasize the inflexibility of procedural knowledge, which is captured, in the folk theory of KH, in the discussion of rehearsal differences. In order to learn how to do some activity X, one must rehearse at doing X. One cannot learn to do X by doing Y unless Y is very similar to X. Thus KH, like procedural knowledge is specific and inflexible.

It is important to note that perfect overlap between the two domains is not required. It might be the case that scientists attribute slightly different characteristics to procedural knowledge than philosophers tend to attribute to KH. It would not follow that they are referring

\(^{58}\) Kandel (2006), p. 133; emphasis in the original.
to altogether different phenomena. At one point, some scientists thought space was absolute and others thought that it was relative – but it does not follow that they were talking about two different things. So long as there is basic agreement about paradigm cases and central characteristics (as there seems to be in this case) there is good reason to accept the conclusion that everyone is talking about roughly the same thing, even if there are disagreements about the details.

I mentioned above that few (if any) philosophers seem to be aware of the neuroscientific work described in this paper. And I suppose that it is still possible that upon learning about it, some philosophers might insist that even if there are different underlying neural substrates that govern these different kinds of memory and knowledge, nevertheless KH is still a kind of KT. Some might argue, for example, that if Henry is capable of acquiring knowledge of procedures, he is thereby of capable of acquiring a kind of KT. For example, it might be argued that acquiring procedural knowledge of how to ride a bicycle involves acquiring knowledge that riding a bicycle involves pushing the pedals, that it requires one to balance, that it requires one to turn the steering wheel, etc. If that is the case, then someone like Henry with hippocampal system damage is capable of acquiring at least some KT.

Such a response, I believe, misses the mark. For what cases like Henry’s have shown is that someone can be capable of riding a bicycle and yet not have any knowledge that riding a bicycle requires any of the things mentioned above. That is to say that knowing how to ride a bicycle is not equivalent to knowing the rules for riding a bicycle. Of course we can describe how to ride a bicycle in terms of what rules one should follow (as we did above), but it does not follow that KH is a kind of KT. If it did, then scientists working with Henry should be able to enable him to acquire KT by teaching him rules or procedures for acquiring it. For if Henry is
capable of learning procedures, then it seems he could learn the procedure that: whenever you see “that guy” call him “Dr. Smith” and thereby remember his doctors’ names. Not surprisingly, some have tried this. Cohen and Eichenbaum report that:

Certainly we can think of all sorts of rules that we would not consider to be mediated by procedural memory and that would not be learnable by amnesic patients such as H.M. (e.g. “whenever you see the faces of the authors of this book, say ‘Hello, Neal and Howard’” – something that, despite our best efforts, H.M. could not be trained to do).  

3.5.3 Further Objections and Responses

There are, of course, a number of other ways to challenge the argument that I have given. Here, again, is the argument:

P1) Damage to the hippocampal system leads to the inability to form new memories of certain sort.
P2) This, in turn, inhibits the ability to acquire new propositional knowledge, or KT.
P3) Nevertheless hippocampal system damage spares the ability to form new procedural memories
P4) Thus, those with such damage are able to acquire new KH.
P5) If it is possible for individuals to acquire new KH but not to acquire new KT, then KH and KT must be distinct kind of knowledge.

C) KH and KT are distinct kinds of knowledge.

The most likely objections, I suspect, will involve either challenging premise (P2) by arguing that amnesics such as Henry do, in fact, have KT; or challenging premise (P4) by arguing that amnesics such as Henry lack KH. In what follows I consider and respond to both sorts of objections.

3.5.4 Challenging P2 – Why Henry Does Not Have KT

I expect that those who are unsympathetic to the Distinction Hypothesis (DH) will simply insist on the claim that amnesics such as Henry do, in fact, have some propositional knowledge with respect to the skills they acquire, such as 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.\(^6^0\)

It might be argued that amnesics such as Henry do have beliefs about the skills they acquire, but that these beliefs are tacit, or implicit, or in some other way outside the purview of 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

\(^6^0\) See my discussion of memory and knowledge in Section 3.5.1 above. 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.
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.\(^61\)

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.\(^62\)

\(^61\) 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. p. 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.

\(^62\) 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. It was not the case with Henry that beliefs could be brought to conscious awareness over time (presumably, this precluded the possibility of Henry participating in psychotherapy).
3.5.5 Challenging P4 – Why Henry Does Have KH

It might be argued that Henry is capable of acquiring certain abilities, but that this does not amount to KH, since having an ability is not the same as having KH. One might, for example, have the ability to hit a hole-in-one in golf without being said to know how to do so. Additionally, automatic or reflexive actions might be categorized as abilities (e.g. the ability to digest food), but not as KH. So what makes it the case that Henry M. has KH rather than merely possessing new abilities – especially if it is true that Henry M. lacks propositional knowledge with respect to these abilities, as I have argued above?

Well, assuming that Henry must have KT with respect to his newly acquired abilities in order to possess KH with respect to those abilities is question-begging, as noted above. But what positive reasons are there for ascribing KH to Henry with respect to these abilities? There are a number of things to say in response. Henry does learn how to do the relevant procedures – that is, he expends cognitive effort to improve his performance using trial-and-error methods while practicing the activity. He does, in fact, improve his performance over time, with practice. And he retains what he has learned over long periods of time. These are good prima facie reasons to attribute KH to Henry. However, to provide a truly satisfactory response to this challenge (of saying why Henry does indeed possess KH), one needs an account of what KH is. I provide such an account in Chapter 6, and I have said a bit in anticipation of that theory in previous chapters. Again, I will summarize my response here and refer you to that later chapter for further details.

In brief, we should ascribe KH to Henry M. with respect to these newly-acquired abilities because functionally speaking, Henry knows how to do them. KH states are mental states, and mental states are best characterized in functional terms. So as long as something within Henry is

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[63] Stanley and Williamson (2001) present an argument for the conclusion that possessing KH implies possessing KT (since, on their view, KH is a species of KT). I discuss that argument at length in Chapter 5.
playing the functional role of a KH mental state with respect to that specific ability, then we should conclude that he possesses KH with respect to that ability. What is the functional role of a KH mental state? In broad terms, we should say that some person, \( P \), knows how to do some activity, \( x \), if \( P \) has practiced/rehearsed doing \( x \), thereby forging connections to other mental states related to \( x \) (including proprioceptive states required for doing \( x \)), which thereby allow \( P \) to successfully exercise the ability to do \( x \) (in the absence of defeating conditions). Henry fits this description with respect to the tasks described above, and so it is accurate to say of Henry that he knows how to do them (i.e. possesses KH).

My functional theory of KH can be used to defend the claim that Henry has KH when he learns new skills and abilities. It can also explain the neurological results discussed above. If we consider the two types of knowledge from a functional perspective, it seems clear that KH mental states and KT mental states play different functional roles in the mind. KT states are, functionally speaking, representational while KH states are action-oriented, or practical. While it is possible for the same entity/system (e.g. the same neural substrate) to play distinct functional roles (hence my emphasis that this is an inference-to-best-explanation type argument rather than a demonstrative proof), it is more plausible to assume that different entities/systems will do so. We should, that is, expect distinct mental functions to be performed by distinct neural systems, which is what we do indeed find with respect to KH and KT.

3.6 Conclusion

In this chapter, I have demonstrated that through the study of amnesic patients such as Henry M., scientists have developed new theories about the neural substrates of cognitive phenomena such as memory and knowledge. These theories have been confirmed by continued research related to both humans and animals. I have argued that this neuroscientific evidence
provides strong support for many aspects of our folk theory of KH. Most significantly, it implies that the Distinction Hypothesis is true, which is the cornerstone of Folk KH.

Furthermore, evidence from the neurosciences suggests the possibility of a more fine-grained taxonomy of knowledge – a taxonomy that further subdivides the category “knowledge-how”. In the next chapter, I will consider evidence from scientists who study the phenomena of intelligence, which provides further support for this picture.
Chapter 4: Intelligence and Knowing-How

4.1 Introduction

In Chapter 2, I presented a folk theory of knowing how (KH) and discussed the common perception that individual aptitudes with respect to knowledge how and knowledge that (KT) often diverge. The distinction, for example, between “street smarts” and “book smarts” is evidence for this, and stereotypes of this nature abound in popular culture: e.g. the mechanical whiz who’s otherwise an idiot, and the genius scientist who cannot tie his own shoes. Determining whether or not such aptitude differences actually exist might shed further light on the question as to whether or not KT and KH are distinct kinds of knowledge. Given the conclusion of Chapter 3, that KH and KT correlate with distinct neural substrates, it seems plausible that we might discover such differences.

In this chapter, then, I consider this question about aptitudes, and the more general question of whether intelligence with respect to one type of knowledge is independent of intelligence with respect to the other type. After surveying the relevant literature on intelligence, I argue that it reinforces the conclusion supported by the neurological evidence, discussed in the previous chapter – namely, that KH and KT are fundamentally distinct kinds of knowledge – that is, that neither KH nor KT reduces to, nor is a species of, the other.

Broadly speaking, I will show that modern intelligence tests measure something like KT, and that many skills and abilities that tend to fall under the heading KH are not accurately measured by such tests. That is, while intelligence tests accurately predict and assess intelligence related to KT, the same cannot be said with respect to intelligence related to KH. Put another way, one’s score on an IQ test will probably be a good indicator of one’s abilities with respect to acquiring and understanding KT, but will not generally be a good source of
information regarding how successful someone will be when it comes to riding a bicycle (or learning how to ride a bicycle). The fact that “general intelligence” does not strongly correlate with the acquisition of skills and abilities suggests that KT and KH are distinct kinds of knowledge.

Again, my intention is not to point to any of these sources of evidence (i.e. the neurological, psychological, etc.) as definitive proof that KH and KT are distinct, but rather to build a cumulative case that makes such a conclusion more plausible than the alternatives.

4.2 Intelligence and Philosophy

Most definitions of intelligence posit a relationship between it and knowledge. Sometimes, intelligence is defined in terms of ability to learn or acquire knowledge (e.g. “she is intelligent, she picks things up quickly”); other times it is defined in terms of knowledge acquired or possessed (e.g. “he is a Jeopardy! champion, he must be intelligent”). While the two terms, “knowledge” and “intelligence”, are pretty clearly not synonyms (though “intelligent” and “knowledgeable” might sometimes be used interchangeably) it is hard to deny that there is a connection between the two concepts. It would, after all, seem odd to call someone intelligent who neither possessed much knowledge nor was adept at acquiring knowledge. It seems clear, then, that the concept of intelligence has epistemic overtones but it is, surprisingly, another epistemic concept that philosophers have had little to say about.\(^1\) Why have philosophers ignored this concept? And why should they stop doing so?

As to the former question, perhaps (a) philosophers feel that in talking about knowledge, they are, in effect, talking about intelligence (i.e. they are not really ignoring it); or perhaps (b) it is because intelligence is, socially speaking, such a loaded concept – see, for instance, the smoke

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\(^1\) Along with, as I have argued in Chapter 1, the concept of knowledge-how.
and fire surrounding the “Bell Curve” wars of the mid-1990s; or maybe it is because (c) intelligence is such an ill-defined concept. None of these are very satisfactory explanations, however. The first fails because knowledge is not prima facie equivalent to intelligence (e.g. it is not contradictory to suggest that one could possess a lot of knowledge and yet still lack intelligence – consider, for example, the notion of an “idiot savant”), and so analyzing knowledge is not equivalent to analyzing intelligence. The latter two explanations fail in that philosophers do not tend to shy away from topics because they are controversial or ill-defined. It might well be argued that the opposite is true, in fact, and that philosophers tend to be attracted to such topics. Ethics textbooks, after all, are filled with discussion of controversial topics (e.g. abortion, capital punishment, euthanasia, etc.), and some of the concepts most central to philosophers are ill-defined (e.g. truth, beauty, justice, etc.). In fact, according to some the entire role of philosophy is to disentangle conceptual, definitional and linguistic knots in order to solve (or dissolve) problems. The concept of “intelligence” as used by those interested in measuring it, should hold great attraction for philosophers prone to this view. Various tests have been quantifying intelligence for over a century and yet there is still no general agreement about how to define what such tests are measuring (see below for more on defining intelligence)!

So I am not sure why philosophers have ignored the topic of intelligence. But I believe that there are good reasons not to do so. First, because intelligence is an epistemic concept with relations to concepts that philosophers have spent much time analyzing (e.g. knowledge), it seems reasonable to expect that philosophers would have something of interest to say on the matter. Second, according to those who have studied the matter (mostly psychologists of

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2 The Bell Curve: Intelligence and Class Structure in American Life, by Richard J. Herrnstein and Charles Murray (Free Press, 1994) was controversial due to its claims about the heritability of intelligence, and racial differences in intelligence. It sparked a great deal of debate, including a book of essays collected in 1995 under the title The Bell Curve Wars: Race, Intelligence and the Future of America (BasicBooks)
various kinds), intelligence is measurable and quantifiable. IQ tests (and other sorts of intelligence tests, such as SATs) are the means by which numbers are assigned and individuals are ranked with respect to this phenomenon. If this is true, then perhaps this quantification can be put to good use in analyzing related epistemic concepts (such as knowledge). If it is false that intelligence is really quantifiable, then presumably those who have been saying that it is quantifiable have been making a conceptual mistake that philosophers are in a unique position to identify and correct. Finally, the concept of intelligence plays such a central role throughout the lives of so many people that it should not be ignored if there is a contribution that philosophers can make. Intelligence (or whatever is tested by modern intelligence tests) determines, to some extent, how and where children will be educated, what sorts of jobs or careers people get, and, thereby, the distribution of many other social goods.

For my purposes, the notion of intelligence is of interest because studies of this phenomenon tend to support the thesis that KT and KH are best thought of as distinct kinds of knowledge. To demonstrate that, I will first briefly trace the history of intelligence testing up to and including contemporary theories regarding how best to test intelligence and what exactly is being measured by such tests. Consequently, I will argue that the conclusions of those who design, study, evaluate and theorize about such tests ultimately support the conclusion that KH and KT are distinct kinds of knowledge.

4.3 Intelligence: Some History

4.3.1 Intelligence Tests: The Body and the Senses

Francis Galton was a half-cousin and contemporary of Charles Darwin (they shared one grandparent – the well-known Erasmus Darwin). Often described as a polymath, Galton certainly had his finger in lots of pies. “He made,” according to psychologist Arthur Jensen:
…original contributions to many fields…He first gained fame in geography, as an explorer, expertly describing, surveying and mapping previously unexplored parts of Africa…He also made contributions to meteorology, inventing isobar mapping, being the first to write a daily newspaper weather report…He made other original contributions to photography, fingerprint classification, genetics, statistics, anthropology, and psychometrics.³

Galton was an early convert to (and a staunch defender of) Darwin’s theory of evolution and it served as an inspiration for much of his work. He was also an avid quantifier whose motto was “When you can, count!”⁴ These two interests – in evolutionary theory and in counting and measuring – led Galton to investigate (and, of course, measure) differences among individuals (which, according to Darwinism, are a driving force behind evolution). He considered and measured all sorts of individual properties (e.g. height, weight, body type, etc.) and abilities (e.g. reaction time, sensory acuity) – including mental abilities (e.g. memory and judgment). As such, Galton has come to be known as one of the “founding fathers of empirical psychology”⁵ and one of the first to attempt to measure intelligence.

4.3.2 Galton and Intelligence

As noted above, Galton was convinced by Darwin’s theory of natural selection, and he did not hesitate to conclude that evolution applies to human beings as well as to non-human animals. He thus hypothesized that all human abilities, including mental abilities, are to a large degree the result of inheritance, and he set about to investigate the validity of this conclusion. It is important to point out that Galton did not ignore or deny the effect of the environment on

³ Jensen (1998), p. 7. Jensen describes a piece of Galton’s work that should be known to all academics: “[Galton] devised an objective measure of the degree to which a lecturer bored the audience…It consisted of counting the involuntary noises – coughs, feet shuffling, and the like – that issued from the audience, and, with a specially rigged protractor, he measured the angle that listeners’ heads were tilted from a vertical position during the lecture. A score derived from the data obtained with this procedure showed that even the most eloquently written lecture, if read verbatim, was more boring than an extemporaneous lecture, however rambling and inelegant” (p. 8).
⁴ Jensen (1998), p. 8. Jensen provides many amusing stories of Galton’s obsession with counting and measuring. He tried to quantify, among other things, female attractiveness, cake-cutting techniques, and auditory capacities of dogs (leading to the invention of the high-frequency dog whistle which cannot be heard by humans).
individual differences. He was, in fact, the originator of the terminology that continues to
describe this debate: “nature vs. nurture”. So, for example, at the beginning of a discussion of
the “classification of men according to their natural gifts”, Galton wrote:

I have no patience with the hypothesis occasionally expressed, and often implied…that
babies are born pretty much alike, and that the sole agencies in creating differences
between boy and boy, and man and man, are steady application and moral effort. It is in
the most unqualified manner that I object to pretensions of natural equality…I
acknowledge freely the great power of education and social influences in developing the
active powers of the mind, just as I acknowledge the effect of use in developing the
muscles of a blacksmith’s arm, and no further…There is a definite limit to the muscular
powers of every man, which he cannot by any education or exertion overpass. This is
precisely analogous to the experience that every student has had of the working of his
mental powers. (my italics)

4.3.3 Galton’s Indirect Investigations of Intelligence: Genealogy

Galton used both direct and indirect methods for investigating mental abilities. In his
book Hereditary Genius, he sets out to quantify such abilities indirectly, by considering
genealogical lineages. In a preface to the 1892 edition of this book (which was originally
published in 1869) Galton wrote:

The primary object [in writing the book] was to investigate whether, and in what degree
natural ability was hereditarily transmitted. This could not be easily accomplished
without a preliminary classification of ability according to a standard scale.

Galton established such a scale by considering prominent English men and comparing their
numbers to the general population. He investigated the heritability of natural ability by
considering the number of “eminent” offspring and relatives that these prominent British citizens
had. In his words, “(t)he arguments by which I endeavor to prove that genius is hereditary,

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6 Galton’s 1874 book English Men of Science was subtitled Their Nature and Nurture. He used the expression in
some other publications that same year, and perhaps earlier (though citations for earlier ascriptions are lacking).
7 Galton (1892), pp. 14-5.
8 Galton (1892), pp. x - xi. From the Prefatory Chapter of the 1892 edition. The book was originally published in
1869.
consist in showing how large is the number of instances in which men who are more or less illustrious have eminent kinsfolk.””\textsuperscript{9}

Galton was quite rigorous in his investigation and he used and developed new (and some still-used) statistical methods for making comparisons, such as normal distribution curves. He was also catholic in his choice of subjects. As such, the “illustrious” and “eminent”\textsuperscript{10} men he considered were from a variety of occupations including judges, statesmen, nobles, military leaders, writers (of literature and poetry), scientists, musicians, religious figures, and academics (specifically, classicists). For comparison purposes, he also included some data on athletes (oarsmen and wrestlers). He ultimately concluded that mental abilities are, indeed, hereditary, and that the offspring and relatives of eminent and illustrious men are much more likely to achieve those heights than the less well-born.\textsuperscript{11} He also noticed that the sons of eminent and illustrious men were much more likely to share their fathers’ status than those more distantly related (e.g. cousins). In other words, heritability of mental abilities drops off the farther away we move on the family tree.\textsuperscript{12}

Galton’s genealogical approach to mental abilities, then, supported his preliminary hypothesis. But what exactly did it show about “intelligence”? Did he demonstrate the heritability of intelligence? Perhaps. But arriving at that conclusion depends upon acceptance of the premise that “prominence” is a measure of intelligence. More generally, it depends upon what is meant by “intelligence”. Galton himself rarely used this term, though the fact that he uses the terms “genius” and “mental abilities” suggests that intelligence, or something like it, is

\textsuperscript{9} Ibid, p. 6. Galton considered mostly men, but also some women – though not generally as primary subjects .
\textsuperscript{10} Galton had relatively strict criteria for these categories, which he developed using lists of prominent Englishmen. Eminence is found once in every 4,000 men, while illustriousness is a one-in-a-million rank.
\textsuperscript{11} He considered and ultimately rejected the possibility that environmental factors explained these results.
\textsuperscript{12} Galton (1892) wrote that “the eminent sons are invariably more numerous than the eminent brothers…On proceeding further…we come to a sudden dropping off of the numbers at the second grade of kinship, namely, at the grandfathers, uncles, nephews and grandsons…On reaching the third grade of kinship, another abrupt dropping off in numbers is again met with…”, p. 318.
Galton’s subject. Assuming, then, that Galton is talking about intelligence, we should then ask, what exactly is his conception of intelligence? Is it similar to our modern conception of intelligence? Or so different as to render his investigations uninteresting to modern psychologists?

Galton’s view of intelligence is evolutionary in the sense that he ties the notion of intelligence to the notion of adaptation and success. Thus, his use of prominence as a scale for intelligence. We might, then, interpret Galton as conceiving of intelligence in terms of whatever mental abilities in general contribute to the survival and success of individuals. This implies, however, that Galton does not see intelligence as one specific thing but rather as a collection of abilities. Such a conclusion might also be supported by pointing, again, to the wide variety of prominent figures that Galton surveyed – from judges, to academics, to artists and poets. If we assume that achieving prominence in different occupations require different abilities, then again we might see Galton as presuming that intelligence is not one, unitary thing.

This raises a question that contemporary intelligence theorists still heatedly argue about; namely, is intelligence “unitary” or “multiple”? That is, is intelligence a single thing that can be relatively accurately measured by a test (or series of tests)? Or are there any number of “intelligences” that are independent of each other (to some degree), and thus only weakly correlate, if at all, with what intelligence tests measure. It should be clear that this debate has potential connections to the debate about KH and KT. It would be prima facie odd (though not necessarily contradictory) to say that there is only one “intelligence” but a number of different sorts of knowledge. Conversely, if it can be shown that there are multiple intelligences that

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13 For example, the distinction between a priori and a posteriori knowledge seems perfectly consistent with unitary intelligence.
correspond in some way to multiple kinds of knowledge, then the argument that KH and KT are distinct would seem more plausible.

So, where does Galton stand with respect to the unitary/multiple intelligence debate? As noted above, there are reasons for putting him in the “multiple” category – e.g. his evolutionary tendencies, his talk of mental abilities (plural), and his consideration of prominent persons from a great variety of occupations (which seemingly require different abilities). However, some have argued that Galton does, in fact, see intelligence as a single faculty. Jensen, for example, claims that “the belief that mental ability is a general, unitary trait was introduced into psychology by [Herbert] Spencer and Galton.”\(^\text{14}\) How to justify such a claim? Well, in order to interpret Galton as having the view of intelligence that Jensen attributes to him, it would have to be the case that Galton thought that there was one, unitary thing that underlies all mental abilities which contribute to survival and success. Thus, he would have to believe that achieving prominence in any of the variety of occupations that he surveys is always due to this one faculty. Does Galton provide evidence that he held such a view?

He does argue that illustrious men would inevitably succeed in some field, even if not in the field they are known for. He wrote that, “(n)o man can achieve a very high reputation without being gifted with very high abilities; and I trust that I have shown reason to believe, that few who possess these very high abilities can fail in achieving eminence.”\(^\text{15}\) Similarly, he claims that:

I believe…that, if the “eminent” men of any period, had been changelings when babies, a very fair proportion of those who survived and retained their health up to fifty years of age, would, notwithstanding their altered circumstances, have equally risen to eminence.\(^\text{16}\)

\(^{15}\) Galton (1892), p. 49.
\(^{16}\) Ibid, p. 38.
But what of his insistence on talking about “abilities”, in the plural? Well, he does sometimes talk about “intellectual ability” (singular). For example, in his consideration of the question, “how much of a man’s success is due to his opportunities, how much to his natural power of intellect?”, Galton responds that if someone possesses “intellectual ability, eagerness to work and power of working” it is unlikely that such a person “should be repressed”.  

These quotes are suggestive but do not definitely show that Galton conceived of intelligence as a unitary faculty. His use of the phrase “intellectual ability” does not necessarily imply that there is only one such ability, just as the use of the phrase “dancing ability” does not imply that there is only one ability required for dancing (one must have balancing ability, jumping ability, etc.). Perhaps Galton is using the term “intellectual ability” as a catchall, meant to include all “mental abilities” (the plural term is, after all, much more common in Galton’s writings). Also, his claims regarding success across disciplines for those who are prominent need not imply that intelligence is unitary. One might believe that a genius at mathematics will succeed no matter what (perhaps because there are so many ways that mathematical ability can be utilized), without believing that mathematical ability is the only kind of mental ability.

Are there other reasons for thinking that Galton viewed intelligence as unitary? Jensen writes that:

Galton further concluded that what was inherited was essentially a general ability, because eminent relatives in the same family line were often famous in quite different fields, such as literature, mathematics, and music. He supposed that this hereditary general ability could be channeled by circumstance or interest into different kinds of intellectual endeavor. He also recognized special abilities, or talent, in fields like art or music, but considered them less important than general ability in explaining outstanding accomplishment, because a high level of general ability characterized all of his illustrious persons (emphasis added).  

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17 Galton (1892), pp. 38-39. He also refers to “eagerness to work” as “zeal” and “power of working” as “capacity for hard labour”.
The claim is problematic in that it seems to posit multiple abilities (i.e. general ability plus a number of special abilities) that fall under the heading of intelligence – which is inconsistent with Jensen’s claim that Galton viewed intelligence as unitary. Even if Galton considered special abilities as “less important than general ability” it does not follow that he excluded them from his notion of intelligence. The claim that “general ability” is the most important aspect of “intelligence” is simply not the same as the claim that general ability is intelligence.

What about Galton’s observation that children sometimes excelled in different fields than their parents? Is Jensen right to suggest that this implies belief in a unitary notion of intelligence? Again, not necessarily. As noted above, a particular ability (e.g. mathematical ability) could be useful in many different occupations – that does not mean that it is the only mental ability that could lead to success. Additionally, if Galton conceived of intelligence as consisting of multiple parts (e.g. general ability + special ability + zeal + hard work) then a child who inherited three out of four of these traits from her parents might well succeed, but in a different field.

However, it seems that Jensen is focusing on “general ability” here, and equating that with intelligence. He quotes the following bit from Galton’s *Hereditary Genius* to support his view:

> Numerous instances recorded in this book show in how small a degree eminence can be considered as due to purely special powers. People lay too much stress on apparent specialities, thinking that because a man is devoted to some particular pursuit he would not have succeeded in anything else. They might as well say that, because a youth has fallen in love with a brunette, he could not possibly have fallen in love with a blonde. As likely as not the affair was mainly or wholly due to a general amorousness.\(^{19}\)

But again, this quote does not deny other facts that figure into intelligence, it just suggests that they play a smaller role than “general ability”.

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Ultimately, I think that Jensen is right to say that Galton sometimes suggests that there is such a thing as general ability and that he sometimes uses that term to mean “intelligence”. But just as often, Galton talks in terms of mental abilities and intellectual faculties – and he lists multiple factors in addition to general ability that seem significant with respect to achieving prominence (e.g. special abilities, memory, originality, etc.). The correct conclusion to draw, I believe, is that Galton simply was not thinking about mental abilities in terms of the unitary/multiple intelligence debate. This explains why he did not address the question head-on, and why he tends to talk one way sometimes and the other way at other times. Galton is more concerned with the question of heritability, I would argue, and less concerned with specifying what exactly it is that is inherited (other than “abilities” in general). To use an analogy that Galton himself often invokes, consider physical ability. Galton puts this comparison to use at the end of *Hereditary Genius* when he considers genealogies of oarsmen and wrestlers.\(^{20}\) He finds, not surprisingly, that athletic ability also runs in families (something that he believed to be less controversial than the view that mental abilities run in families). He might also find that children of wrestlers often succeed at other sports, such as rowing. Should the conclusion be that “physical ability” is a general, unitary thing which is sometimes supplemented by one “special ability” and sometimes by another? Perhaps, but it might also be the case that there are multiple factors involved in “general physical ability” – e.g. coordination, balance, etc. – and further investigation will allow us to make finer discriminations. Indeed, in the next stage of his investigation – direct testing of mental abilities – Galton seems to be considering and investigating this possibility of finer discriminations.

\(^{20}\) Galton (1892), pp. 305-315.
4.3.4 Galton’s Direct Investigations of Intelligence: Sensory Acuity

In addition to his genealogical investigations, Galton also attempted to evaluate mental abilities more directly. Beginning in 1884, he “created a series of tests (many requiring specialized mechanical instruments) that could be taken by the members of the general public.”\(^{21}\) These tests bore little resemblance to modern intelligence tests. Galton thought that the best way to measure intelligence was by measuring things such as the “acuity of the senses”. He wrote:

> The only information that reaches us concerning outward events appears to pass through the avenue of our senses; and the more perceptible our senses are of difference, the larger the field upon which our judgment and intellect can act.\(^{22}\)

This is not a completely implausible view, if one accepts its empiricist presuppositions. If all knowledge originates in the senses, after all, then those with the best (i.e. most acute) senses are in the best position to accumulate the most knowledge. But the question arises as to why Galton would accept this empiricist view most commonly associated (in Galton’s day) with Locke. After all, Locke’s “blank slate” theory of the human mind seems to clash directly with Galton’s view that human abilities are largely inherited. The seeming inconsistency, however, is relatively easily explained.

The apparent inconsistency stems from the following claims: Galton believes that (a) human abilities (including mental abilities) are, to a large extent, inherited; yet his tests of mental abilities seem to presuppose that (b) the senses are the source of all knowledge (“the only information that reaches us concerning outward events appears to pass through the avenue of our senses” – from the above quote). But if Galton believes that intelligence is inherited, why not think that knowledge is inherited as well? The puzzle dissolves, however, if we focus on the difference between knowledge and the knowledge-acquiring (i.e. mental) abilities. The latter

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\(^{21}\) Wasserman and Tulsky (2005), p. 4.

\(^{22}\) Galton (1883), p. 19.
are, to a large extent, inherited according to Galton while the former is not. So what differentiates those with superior mental abilities from those with inferior mental abilities is not the amount of knowledge they possess, but rather their knowledge-acquiring capacities. And, as Galton points out in the above quote, since the ultimate source of knowledge is the senses, then the best way to test knowledge-acquiring capacities is to test sensory acuity.

So Dalton tested various aspects of the senses in order to test intelligence. His tests:

…included measures of physical characteristics (e.g. height, weight, head size, and arm span), sensory acuity (vision, audition, olfaction), motor strength, reaction time (to visual and auditory stimuli), and visual judgments (line bisection and estimating an angle).

Those who worked with and followed Dalton, especially (in America) J.M. Cattell, also focused on testing “the body and the senses”. It is worth considering all the “basic tests” that Cattell used to measure intelligence at around the turn of the century (1896):

- **Dynamometer pressure**: An index of strength, measured by the maximum pressure for each hand.
- **Rate of hand movement**: An index of motor speed, measuring the quickest possible movement of the right hand and arm from rest through 50 centimeters.
- **Two-point sensation thresholds**: A measure of fine sensory discrimination, involving the minimum discriminable separation distance between two points on the skin.
- **Pressure causing pain**: A sensory test, measuring the minimal degree of pressure applied from a hard rubber instrument before pain is reported.
- **Least noticeable difference in weight**: A perceptual judgment task, measuring the lowest difference threshold at which the weights of two wooden boxes can be discriminated.
- **Reaction time for sound**: A reaction time task, measuring the time elapsed between an auditory stimulus and a voluntary motor response.
- **Time for naming colors**: A speed task, measuring the time required to name 10 colors.
- **Bisection of a line**: A perceptual judgment task, determining the accuracy with which the midpoint of a 50-centimeter rule may be identified.
- **Judgment of 10 seconds of time**: A perceptual judgment task, measuring the accuracy with which an interval of 10 seconds can be estimated.
- **Number of letters repeated on one hearing**: An immediate memory span task, measuring the maximum number of letters that can be repeated immediately after auditory presentation.
These tests were:

…supplemented by a more comprehensive series of 50 tests – 33 of which measured different forms of sensory acuity and discrimination (sight, hearing, taste and smell, touch and temperature); 7 of which measured reaction time for simple and complex decisions; 7 of which measured mental intensity and extensity; and 3 of which measured motor abilities.  

There are a few things to notice about such tests. First, only two of the tests described above explicitly involve any linguistic behavior on the part of the person being tested – i.e. the memory test and the color-naming test; and even these could conceivably be designed so as to exclude verbal responses (for example, by having the person point to the letters/colors that were heard/named). That is obviously a significant difference between Galtonian tests and the intelligence tests that followed (which are discussed below). Second, notice that there is no mind/body distinction being drawn here. Most of the tests described above involve some sort of bodily behavior, and some directly test motor skills. And yet these tests are designed to indicate the degree of one’s “mental” abilities. Galton does not seem to recognize a bright line demarcating the mental from the physical. He does, at times, differentiate the mental from the physical, but it does not seem to be a metaphysical distinction, for Galton, but rather a pragmatic one. This suggests, then, that Galton’s notion of mental abilities was much more broad than what came later. It also suggests that Galton would not tend to conceive of intelligence primarily in terms of the ability to acquire (and retain) propositional knowledge, or KT. His inclusion of tasks that required certain physical characteristics, motor skills and, in some cases, brute strength, suggests that the ability to acquire and retain KH figured into his notion of intelligence. This is consistent with an evolutionary perspective on intelligence, since both mental and physical abilities would have obvious survival value.

23 Wasserman and Tulsky (2005), p. 5.
Those familiar with modern tests of intelligence might well ask why Galton believed that his sorts of tests would be the best way to determine one’s mental abilities? Even if the senses are the source of all knowledge, why not use more straightforward and direct methods of testing actual knowledge in individuals, such as asking questions or presenting puzzles that would require complex or creative reasoning abilities? It seems that Galton believed that such tests would not truly measure inborn mental abilities since one could be taught the answers to questions and strategies for solving puzzles. So a test that used such methods would not truly discriminate between inherited mental abilities and environmentally-acquired knowledge. If, on the other hand, one tested the “basic” functions that underlie knowledge-acquisition (especially sensory acuity), then one could presumably rule out stuff that was acquired by nurture, rather than nature.

Again, there is a certain amount of plausibility to this view. To invoke the analogy to physical abilities, a basketball coach dealing with a group of children who never before played basketball might well test their “basic” skills – as opposed to simply asking them to start shooting baskets. Why? Because possessing basic skills would indicate an ability to acquire the more complex skills down the road. And lacking complex skills when one first begins does not necessarily indicate an inability to acquire such skills. Additionally, consider a coach who simply brings in a group of people and asks them to start shooting baskets and then chooses, for the team, whoever makes the largest percentage of baskets. A beginner with great basic skills might well lose, in such a competition, to a mediocre player with years of experience. Ultimately, one might argue, if a coach wants to put together the best basketball team in the long run, he or she will try to determine which recruits have the best natural abilities, and this would
be done by testing the basics. Galtonians seem to have something like this thought in mind with respect to mental abilities.

Before moving on to a consideration of some of the problems with Galtonian intelligence tests, it is worth noting that Galton also employed other sorts of empirical tests in his investigations of mental abilities. He was, for example, one of the first to study identical twins, and compare their abilities to those of fraternal twins and non-twin siblings. Twin studies, of course, remain an invaluable source of data for those involved in research related to the nature-nurture debate. He also created and/or developed new statistical methods (e.g. the precursor to the notion of standard deviation), which have been invaluable to empirical psychologists since Galton. In general, Galton is highly regarded by those who study intelligence and he is considered “one of the two founding fathers of empirical psychology.”

4.3.5 Problems with Galtonian Intelligence Tests

Perhaps it will not surprise modern readers to learn that Galtonians found their tests to have little correlation to other common markers of intelligence such as education and eminence. They were “dismayed that the measurements of sensory discrimination and speed of reaction appeared to show so little relationship to a person’s level of general mental ability (as indicated by educational and occupational attainments).” But why be dismayed? Why not simply

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24 Jensen (1998), p. 9. The other is Wilhelm Wundt “who established the first laboratory of experimental psychology in 1879 in Leipzig” (pg. 9). It should be mentioned that Galton is rather infamous in some circles because of his advocacy of eugenics (in fact, he came up with the term which is from the Greek for “good birth”, and began the movement).

25 Jensen (1998), p. 11. According to Jensen, however, “Galton’s original data have been analyzed by modern methods of statistical inference” and “it turned out that his original hypotheses were largely correct after all.” Modern methods of analysis have “revealed highly significant differences between groups differing in educational and occupational level on Galton’s discrimination and reaction-time tests” (pg. 11). This modern analysis that Jensen refers to can be found in: Johnson, R.C., McClearn, G.E., et. al. (1985). Psychologists such as Jensen and Hans Eysenck have taken up (or re-taken up) the study of sensory acuity and intelligence using modern methods and technologies.
conclude that educational and occupational attainments depend more upon acquired knowledge as opposed to innate abilities?

Well, with respect to Galton himself, he clearly believed (as indicated by his genealogical investigations of intelligence) that eminence (e.g. educational and occupational attainments) is an indicator of innate mental ability. So he simply could not ignore the fact that the basic tests he was performing were not correlated with eminence. But other Galtonians, those who were not committed to this eminence-intelligence connection, could certainly have drawn such a conclusion. What prevented them from doing so? Largely, it was the emerging relationship between tests of intelligence and the field of education.

Galton supported himself on an inheritance. He was not an academic or in industry, but rather did empirical work mostly out of curiosity, with little direct concern for practical applications of the results. But some of those who studied with Galton, and/or studied his methods, were more narrowly focused. For example, Galtonian J.M. Cattell specifically developed his battery of tests (described above) in order to evaluate the abilities and progress of college students (as well as to evaluate their courses). It was, in fact, one of Cattell’s graduate students (using new statistical techniques) who eventually got around to comparing the results of students’ performance on these tests to their academic performance in general. The graduate student, Clark Wissler:

…used the then-new statistic of correlation coefficients to examine the correlations between Cattell’s tests and student grades for over 300 undergraduates. The results showed negligible correlations between Cattell’s laboratory tests and overall academic performance, as well as negligible intercorrelations between the laboratory tests, indicating that the tests had little relationship to each other or to academic achievement. At the same time, the correlations between assigned grades in various college classes, however, were substantially higher than any correlations of the tests with grades.\textsuperscript{26}

\textsuperscript{26} Wasserman and Tulsky (2005), pp. 5-6.
Wissler’s results contributed significantly to the sharp decline in the sorts of tests that Galton and Cattell had been using to test intelligence (now called “anthropometric testing”), and to the subsequent adoption of intelligence tests that look much more like those in use today. Such tests, by design, are used to predict and evaluate academic performance. This tight connection between such tests and scholastic performance contributed to the modern tendency to equate the notions of “intelligence” and “good in school”. However, as modern critics of intelligence tests have pointed out, it should not surprise us that tests designed to correlate with scholastic performance lead to such a view of intelligence. What should surprise us, such critics claim, is that we have bought into the view that such tests measure some general phenomena of “intelligence” that applies outside of academic settings as well. More on this dispute below.

4.3.6 Binet and the Birth of Modern Intelligence Tests

The first modern intelligence tests were developed by Alfred Binet and his associates in France in the late 1800s and early 1900s. Binet was a self-trained psychologist who became interested in intelligence, in part, by observing his two daughters and observing the differences between them regarding things like behavior, personality and problem-solving skills. Early in his study of psychological phenomena (including mental abilities), Binet was quite Galtonian in his view that intelligence is related to sensory acuity. In an 1890 paper, Binet wrote:

What is called intelligence, in the strict sense of the word, consists of two principal things: first, perceiving the external world, and second, reconsidering these perceptions in memory, recasting them, pondering them.27

He was not the quantifier that Galton was, though, and preferred in-depth investigation of a few subjects to drawing general conclusions from many subjects.28 This preference, perhaps,

28 Commenting on long-term studies of his two daughters, Binet wrote: “…The Americans, who love to do things big, often publish experiments made on hundreds and even thousands of persons. They believe that the conclusive
stemmed from his work with his daughters, which began when they were very young and continued, systematically, over the years of their childhood and into young adulthood.

Binet ultimately came to believe that there were a number of separate, independent mental faculties, such as memory, attention, and imagination, and that all of these contributed to intelligence. Interestingly, Binet also believed that some “physical” faculties, such as muscle coordination, were related to intelligence as well. He and colleague Victor Henri set out to develop tests for each of these faculties with varying degrees of success. They considered the sorts of tests that Galton and Cattell had been using and did, in fact, employ anthropometric tests. They later became skeptical that such tests alone would measure intelligence – especially since they ignored complex behaviors such as verbal skills and problem-solving abilities. They were, they claimed, “astonished by the considerable place reserved to sensations and simple processes, and by the little attention lent to superior processes, which some neglect completely.”

Binet ultimately discovered that it was only when tests focused on complex mental processes that clear distinctions among individuals arose.

Binet and Henri became discouraged by their attempts to distinguish various cognitive capacities and measure each separately, and ultimately concluded that “several critical faculties could not be purely, separately, and efficiently measured.” Instead, Binet began to develop tasks that would require using some or all of these faculties at the same time. He used the word “intelligence” as a label for what he was measuring, though he never gave up the idea that “intelligence” consisted of multiple faculties that worked at different levels.

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value of a work is proportional to the number of observations made. This is only an illusion…If I have been able to throw some light by the attentive study of two subjects, it is because I have seen their behavior from day to day and have probed it over a period of several years.” From Binet (1903), quoted in Wolf (1973), p. 120.


31 Though some have argued that Binet did come to hold a unitary view of intelligence, which he equated with judgment. Advocates of such a view typically cite Binet-Simon’s presentation of the 1905 scales in which they
Eventually, Binet came to work with the French government on the subject of education – specifically, on the problem of deciding if and when children were too mentally impaired to benefit from regular schools and needed to be placed in special facilities. Binet, along with his new collaborator Theodore Simon, “undertook the task of developing a reliable diagnostic system to identify children with mental retardation.” Their first version of such a test was completed in 1905 and was revised repeatedly (every few years) thereafter. Their methods for constructing the tests were varied and somewhat hit-and-miss and included consulting teachers and doctors as well as studying children and adults (both “normal” and mentally retarded) directly. According to Wolf:

Binet and Simon set to work to find intellectual tasks that would fall in a hierarchy of difficulty according to the ages at which about 80 or 90 percent success was achieved. Their method for selecting these tasks was empirical: they took many test items to dozens of children, tested individually, and recorded the responses “live.”…The two men spent hours, days, weeks going from schools to asylums, to crèches and hospitals. They studied their subjects’ actual abilities to perform tasks, rather than assuming that they should be able to perform them. Where they drew upon samples of “normal” children in the schools they first consulted the teachers to help identify the children with regular attendance records who were in regular grades for their age and “within two months of their birthdays.”

Eventually, they built up enough data to begin to decide what was “normal” for children at specific ages. After lots of this sort of empirical research, “Binet and Simon arranged thirty items roughly in order of difficulty to test both infants and children three, five, seven, nine, and eleven and twelve years of age or older…” Again, it is worth listing these items in detail and then considering exactly what was being tested (I’ve bolded the numbers for easier reference):

…the first six items…required coordination movements of the head to follow a lighted match, unwrapping food done up in a piece of paper, and the most difficult of the group,

wrote: “It seems to us that in intelligence there is a fundamental faculty…This faculty is judgment, otherwise called good sense, practical sense, initiative, the faculty of adapting one’s self to circumstances.” See Thorndike and Lohman (1990), pp. 15-16 for discussion.

the imitation of gestures and following of simple commands like “Sit down.”…Items seven, eight, and nine test “the degree of communication beyond infancy or idiocy.” The child is first given the name of one of several objects before him, or shown a picture and asked to point out objects: “Show me the cup,” “Put your finger on the window in the picture.” Then…the examiner pointed out objects in a picture and required the child himself to select the correct word for the object…Items ten and twelve required the subject to compare lines and weights.…item eleven [involved] repeating digits…Item thirteen test(ed) suggestibility…Item number fourteen required definitions of words…the fifteenth item [involved] repetition of sentences of fifteen words…the sixteenth test asked for differences between “paper and cardboard,” “a fly and a butterfly,” “wood and glass,” and so on…The seventeenth test…required naming from memory as many as possible of thirteen objects displayed for thirty seconds on a board…In the eighteenth item the experimenter asked the subject to reproduce from memory two designs shown for ten seconds…The nineteenth test presented longer series of digits than [item] number eleven, to test immediate memory, and the twentieth required the subject to report resemblances between a “poppy and blood,” “an ant, an insect, a butterfly, and a flea,” “a newspaper, a label, and a picture.”…The twenty-first item asked for a comparison of lengths of lines, shown in couples, with one easy series, and a second much more difficult, so that even many adults failed it; and number twenty-two required a comparison of five blocks, which were to be put in order of weight…The twenty-third item asked which weights from the previous test the examiner had removed. Number twenty-four turned to different problems. The subject was asked to find rhymes for given words…Number twenty-five was a word-completion test…and the twenty-sixth asked the subject to put three nouns – “Paris, river, and fortune” – or three verbs into a sentence…The twenty-seventh was labeled an “abstract question,” or as later called, “a comprehension question.” For example: “When a person has offended you, and comes to offer his apologies, what should you do?”…In the twenty-eighth item, the subject was asked to invert the hands of a clock with no visual aids permitted, and the difficulty was increased by asking why the inversion is never exact. The twenty-ninth required a drawing of what a folded and cut paper would look like when unfolded; and number thirty requested the subject to define abstract words by designating the difference between such words as “esteem” and “friendship,” “boredom” and “weariness.”

34 Wolf (1973), pp. 179-182. Some of the test items were influenced by the work of German psychologist Hermann Ebbinghaus, who used sentence-completion tests in his studies of learning and memory, and others by French doctors Blin and Damaye who were also working on the problem of discerning mental impairment. See Thorndike and Lohman (1990), pp. 11-12, for discussion of these influences.

How does Binet and Simon’s initial test compare to Galtonian tests? There are still a few “basic” tests in Binet-Simon (mostly aimed at infants and very young children), and tests of sensory acuity (numbers ten, twelve, twenty-one, and twenty-two, which involve comparing lines and weights), but not many. And both Galton and Binet-Simon use memory tests – though
Binet-Simon’s memory tests are more extensive. The most obvious difference involves the linguistic items, which were completely absent from Galtonian tests (with the exception of repeating numbers and naming colors). Binet-Simon tested subjects on providing rhymes, definitions, descriptions, comparisons and answers to complex questions.

Obviously, this first Binet-Simon test is much closer to modern intelligence tests than the Galtonian tests. There are few items in Binet-Simon that could be considered “physical”, but the consideration of “motor skills” and the like have been mostly eliminated. And while Binet-Simon certainly tests certain kinds of mental abilities (e.g. recall, judgment, etc.) it also requires an increasing amount of propositional knowledge. Specifically, one must know that certain words and sentences have certain meanings and that they require certain reactions and responses (i.e. semantic knowledge). In short, paradigmatic cases of knowledge-how, such as riding a bicycle or performing mechanical abilities, are not directly tested by Binet-Simon, while paradigmatic cases of knowledge-that, such as the meanings of words and sentences, are directly tested by Binet-Simon. Put another way, one who had lots of KT but little KH could do well on this test, while the converse is not the case.

Binet and Simon were aware that this test had shortcomings, both with respect to content and with respect to administration (it took a relatively long time to administer the test and then to score it, since different sorts of answers to some questions earned different scores). They also struggled with the question of what exactly they were testing. They agreed that they were testing intelligence in some sense – but in what sense exactly? Well, certainly in a developmental sense. That is, they believed that the results of their test indicated “mental level” in that one’s score could indicate one’s intellectual level relative to others of various ages. This idea, that there were normal mental levels that corresponded to chronological age, would later be used to
develop the notion of IQ (though not by Binet and Simon). They also believed that they were testing some basic intellectual capacities, such as judgment and memory, which were indicators of more general intelligence. However, Binet and Simon recognized that their test was far from foolproof and that various environmental factors unrelated to a child’s mental abilities, such as early-childhood neglect, poverty, or illness, could lead to poor performance on the test. Thus they recommended that the test scores be considered along with medical information and reports from teachers who had worked with the children individually. They were also well aware that the test needed much more fine-tuning and were thus leery of putting too much weight on exact scores as determining boundaries between categories such as “normal” and “retarded”. Finally, Binet and Simon considered the possibility that a child might have special aptitudes that were not indicated by their test (presumably things like musical or mathematical aptitudes). In short, as Binet’s biographer notes, “the originator of intelligence measurement, therefore, was not at all unaware of the limitations of his instrument for assessing individual differences.”

Binet was not only aware of the limitations of the Binet-Simon scales, he was also aware that he lacked a theory of intelligence that explained the success of these tests. As noted above, he had ideas about what intelligence was (which were not necessarily consistent – see footnote 32 above), but the tests were only minimally theory-driven and mostly guided by empirical tests and observations (i.e. by what worked). There were, however, certain assumptions that guided the development of the Binet-Simon scale.

The first assumption was that the functions involved in intelligence showed an increase with age. That is, whatever intelligence is, it is something that shows a normal and fairly consistent course of average development: Older children have more of it than younger children. The second assumption was that intelligence is needed for success in school. Thus, those judged to be bright by their teachers possess more intelligence than those whom teachers judged to be dull…In order to be included in the scale, a test had to show a pattern of decreasing difficulty for older children and a higher success rate for those

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children labeled bright by their teachers... These two criteria continue to form the basis for the development and selection of test items for the measurement of intelligence today.\textsuperscript{36}

The first assumption, as will be discussed below, applies to intelligence related to both KH and KT. The second assumption, however, is much more relevant to intelligence related to KT than to KH.

4.3.7 Intelligence After Binet: IQ, g and Factor Analysis

Binet and Simon significantly revised their test in 1908\textsuperscript{37} and it was this version of the test that caught on and spread across the world – particularly in Europe and America\textsuperscript{38} (though not, ironically, in France where Simon and Binet developed the test). Further revisions were published every few years (Binet died in 1911 but Simon continued to actively research and revise the tests). As the test was revised, it was also adapted to be taken by children of all ages as well as adults. By the 1911 versions, the tests:

…included procedures assessing language (e.g., receptive naming and expressive naming to visual confrontation, sentence repetition, and definitions of familiar objects), auditory processing (e.g., word rhyming), visual processing (e.g., rapid discrimination of lines, drawing what a folded paper with a piece cut out would look like if unfolded), learning and memory (e.g. repeating prose passages, repeating phrases and sentences of increasing length, drawing two designs from memory, recalling the names of pictured objects, and repeating numbers), and judgment and problem solving (e.g., answering problems of social and practical comprehension, giving distinctions between abstract terms).\textsuperscript{39}

Note the same basic kinds of tests as in the 1905 version, with an even greater emphasis on linguistic and semantic knowledge. There is very little focus on tasks that would require

\textsuperscript{36} Thorndike and Lohman (1990), p. 18.
\textsuperscript{37} Only 14 of the original 30 tests remained unmodified. Other changes included expanding the scale to include 54 tests, changing the groupings of the tests, and improving the administrative features so that it was less like a “clinical interview” (as the 1905 scale had been) and more like a “standardized test”. See Thorndike and Lohman (1990), p. 13.
\textsuperscript{38} Thorndike and Lohman (1990) write that “to say that the 1908 scale had a major impact on American clinical and educational psychology would be one of the understatements of the century. To say that the scale took the United States by storm would be more accurate,” p. 29.
\textsuperscript{39} Wasserman and Tulsky (2005), pp. 7-8.
paradigm cases of knowing-how (with the exception of the drawing task – though even that is not a test of drawing per se, but rather a way of testing spatial reasoning).

In the United States, the Binet-Simon tests were being investigated on a large-scale (making his comment quoted in footnote 29 above prescient), and tweaks and revisions were being made – both with respect to content and administration. Lewis M. Terman “developed the most successful American version of the Binet-Simon scales”. Terman had “noted some limitations of Binet’s work” and “by 1912 he had eliminated some items and added others while testing several hundred children to improve the Binet-Simon procedures.” These tests, developed by Terman at Stanford University and originally published in 1916, became known as the Stanford-Binet tests and survive, in some form, to this day. These tests were adapted for use in evaluating Army recruits for World War I. Eventually, all those entering the Army were tested and by the time the war was over, almost two million men had undergone the tests.

Ultimately, the Binet-Simon tests, and those that were adapted from them, resulted in one overall score – a number that became the basis for the notion of an “intelligence quotient” (IQ). This number is acquired by dividing mental age by chronological age, and multiplying by 100. Mental age is determined by the use of intelligence tests. If you score the same as an average 10-year-old on the intelligence test, then your mental age is 10. If you do this when you are only eight-years-old, then your mental age divided by your chronological age is 1.25 and your IQ would be 125. Note that while one’s IQ might remain the same over one’s lifetime, that does not imply that one’s “intelligence” stays the same. One must continue to improve one’s score on intelligence tests as one ages (at least through childhood) to retain the same IQ score.

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40 Wasserman and Tulsky (2005), p. 11.
41 This is crudely explained and the measurement of IQ has been refined over the years. German psychologist William Stern is credited with the idea of dividing mental age by chronological age to arrive at an “intelligence quotient”. See Thorndike and Lohman (1990), pp. 34-38 for additional historical details on IQ measurement.
As previously noted, psychologists and intelligence theorists of the time (and, indeed, up until the present time) disagreed about whether intelligence tests were measuring a univocal cognitive phenomenon or a number of separate, distinct cognitive abilities. Adding to the controversy was the fact that no standard definition of “intelligence” could be agreed upon. This problem was highlighted by a 1921 attempt, among those in the field studying intelligence, to come up with a definition of the term. David Wechsler, who had introduced intelligence tests that became more popular than the Stanford-Binet tests, recalled a conference in which 14 different leaders in the profession came up with 14 different definitions of intelligence!

Wechsler noted that this variety:

…proved to me that intelligence was a multisomething [rather than being] one thing. Depending upon your area of interest or specialization you favored one or another definitions. The anthropologist favored…the concept “to adapt” and one of the earliest definitions was “a person’s capacity to adapt to the environment.” Well that is one aspect…but adaptation was an overappreciated area…there are a great many other ways [in which intelligence manifest itself]…If you were an educator…children who have good intelligence will learn faster…so that to an educator…learning is important…I say to you that they are all right but not a single one of them suffices. In presenting a definition…it has to be accepted by your peers.42

On the other hand, those who believed that intelligence was something unitary had strong evidence on their side as well. A British psychologist named Charles Spearman argued for this unitary intelligence thesis and developed a “powerful quantitative method, factor analysis”43 in defense of it.

Factor analysis is a statistical way of investigating correlations and determining whether (and to what extent) they are due to a common factor(s). Spearman, for example, considered the school rankings in various subjects of 22 boys – Math, English, French, Classics and Music. Additionally, he tested the boys for their ability to discriminate musical pitch – a task that seems,

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at first glance, to be unrelated to academic performance. Spearman discovered that the correlations showed a hierarchical order, and using various statistical tools, he determined that a single factor could, in fact, explain his results – even the pitch discrimination results (which correlated higher with performance in the three non-music classes than with the music class). He could also determine to what extent each of these variables (class rankings) were the result of this single factor. Since the correlations were different for different classes (e.g. rank in English was more highly correlated with rank in French than with rank in Music), Spearman concluded that the common factor’s effect was a matter of degree – an idea known as “factor loading”.

Spearman applied factor analysis to results of intelligence tests and his

…most remarkable empirical discovery was that quite different kinds of tests, so long as they all measured some kind of mental ability, all shared at least one common factor…Spearman referred to the one factor that all of the variables have in common as the general factor, which he designated by the symbol g (always printed in lower-case italic, as shown here).  

Of course since the common factor, g, was not perfectly correlated with scores on intelligence tests, the question arose as to what accounted for the remainder. For example, if g accounts for 75% of variation with respect to intelligence tests, what explains the other 25%? Spearman’s theory, called the “Two-Factor Theory” was that:

…individual differences in the true-scores (i.e. error-free scores) on any measurement of any mental ability are attributable to only two factors: a general factor, g, that is common to all mental ability measurements, and some factor, s, that is specific to each and every measurement. Also, g and s are uncorrelated…and the various s’s are uncorrelated with each other.  

Opposition to Spearman’s hypothesis remained, however, and an American psychologist named Louis Thurstone developed a method of multiple factor analysis and used it to argue for a number of primary mental abilities (PMAs) which he claimed were “nearly uncorrelated” and

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44 Ibid, p. 28.
thus independent. Spearman replied that higher-level factor analyses ultimately reveal a common factor, $g$. As Thorndike and Lohman point out:

For several decades the argument over the nature of intelligence centered on how to perform factor analyses…Thurstone actually provided the seeds of a solution to the problem with the idea of rotation…[Thurstone] agreed from the start that the factors of mental ability had modest positive correlations with each other…A rotation to simple structure resulted in factors that were correlated, and these factors could in turn be factor analyzed. When a second-order factor analysis…was performed, a general ability factor similar to $g$ emerged as the reason that the primary factors were correlated. While neither Spearman nor Thurstone was particularly happy with this resolution, by the 1950s the debate about $g$ versus multiple factors had come to be viewed as a methodological issue…Attention came to be focused more on the configuration of the factorial solution – the relationships among factors – rather than on the suitability of a single factor to explain all intelligence.

4.3.8 Recent Theories of Intelligence

As the 1994 publication of *The Bell Curve* demonstrated, there is still much controversy surrounding the notions of IQ and intelligence. The controversy has shifted away from methodology, however. Few intelligence theorists today deny the value of factor analysis or disagree that it demonstrates the existence of $g$. Contemporary intelligence theorists do, however, argue about the nature of $g$ (or, more precisely, the underlying explanation for $g$), and the value of IQ (a number assigned to an individual that strongly correlates with $g$). Is IQ something that is largely innate, and thus relatively fixed? Or is it susceptible to environmental factors and thus changeable? Does IQ really indicate general intelligence? Or does it merely measure the sort of intelligence that will lead to a strong academic performance?

Disagreements about these questions tie into my central concern, which is about how debates about intelligence tie into the debate about KH and KT, and whether they are distinct and independent types of knowledge. According to the folk theory of KH, many individuals have

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46 See Thorndike and Lohman (1990), pp. 69-75 for a concise account of these developments and the debate between Thurstone and Spearman with regard to factor analysis.
47 Thorndike and Lohman (1990), pp. 73-75.
different aptitudes for activities related to KH and KT, respectively. If this is an accurate general picture, we should expect to see those different aptitudes reflected in different levels of intelligence regarding the different types of activity – i.e. we should expect to see “KT-IQ” and “KH-IQ” come apart significantly. Put another way, we should expect that intelligence related to the sorts of skills and abilities typically associated with KH will correlate weakly with intelligence typically associated with KT. We should still expect some correlation, given that both KH and KT are kinds of knowledge and so both will access cognitive aspects of the brain; and also given that many instances of KH have some KT components. However, a very strong correlation between these two types of intelligence might well weaken the case for a distinction between KH and KT.

A look at the relevant literature shows that current research does, in fact, fulfill these expectations. While the two types of intelligence (that related to KT and that related to KH) correlate positively, the correlation tends to be weak. In the next section, I will show that modern intelligence tests require lots of KT and little KH (especially paradigmatic-type examples of KH). Thus, we should expect that someone who does well on an intelligence test (or who has a high IQ) to possess lots of, and be skilled at acquiring, KT. On the other hand, tests that measure aptitudes that are more closely related to KH correlate only weakly with IQ. In short, the psychological evidence regarding intelligence supports the idea that one can possess lots of KT-related smarts but little in the way of KH-related smarts, and vice versa. This in turn provides additional evidence that our pre-theoretical intuitions about KH and KT are correct and that the two kinds of knowledge are, indeed distinct.
4.4 Modern Intelligence Tests

Modern intelligence tests have been tweaked and revised over the years, though the tasks that they require are surprisingly similar to the early Binet-Simon tests described in sections III.5 and III.6 above. The most highly regarded modern intelligence tests are the Wechsler Scales and the updated Stanford-Binet Intelligence Scales. They each correlate strongly with g and (unsurprisingly) with each other. They also reflect modern theoretical views about intelligence – especially the Wechsler Scales, which “bridge the ideas of several different intelligence theories… the modern Wechsler scales are clearly driven by ongoing clinical research and theoretical development.”48 There are different Wechsler scales for adults and children as well as some specialized scales for very young children and for memory. In what follows, I will be referring to the WISC-IV (Wechsler Intelligence Scale for Children, 4th edition, first used in 2003) unless otherwise stated.

The WISC-IV “has a total of 15 subtests, including 10 core subtests and 5 supplemental subtests.” Each will be briefly described below49, with comments related to how much KH and KT are required with for a successful solution.

1) Vocabulary: “The Vocabulary subtest consists of two types of items: picture naming and word definition…An example of a Vocabulary item is ‘What does conceive mean?’”

   This task obviously requires KT. One must know that “conceive” means such-and-such to properly answer the question. While answering such a question also requires some KH (e.g. knowing how to reply, how to hold a pencil, etc.), it is not designed to test such skills or abilities.

2) Similarities: “The examinee is presented with two words that represent common concepts and is asked to describe how they are alike. An example of a Similarities item is ‘In what way are fishes and birds alike?’”

   Again, answering this type of question correctly would require KT – e.g. one would have to know that a bird was an animal and that a fish was an animal, etc. As above (and in many of the subtests that follow) various sorts of KH are required in order to respond to the question, but these are not specifically being tested by the question.

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49 Quotes and descriptions in what follows come from Zhu and Weiss (2005), pp. 300-10.
3) **Comprehension:** “The Comprehension subtest requires the examinee to answer questions based on his or her understanding of general principles and social situations (e.g., “What is the advantage of keeping money in a bank?”).”

   A correct answer would require knowing that banks pay interest, etc. The subtest does not test for KH, other than the ability to answer a question of this type.

4) **Information:** “The examinee answers questions that address a broad range of general knowledge topics (e.g., ‘Name the country that launched the first man-made satellite’).”

   A correct answer would require knowing that Sputnik was the first man-made satellite put in orbit and that the Soviet Union launched it. The subtest does not test for KH, other than the ability to answer a question of this type.

5) **Word Reasoning:** “The examinee is asked to identify the common concept being described in a series of clues…An example of a Word Reasoning item is ‘It is used for transportation, and it goes on water. What is it?’”

   A correct answer would require possession of certain bits of KT but would not require possession of KH beyond the ability to answer a question of this type.

6) **Block Design:** “The Block Design subtest requires the examinee to view a constructed model or a picture…and to use one-color or two-color blocks to recreate the design within a specified time limit.”

   This is the first subtest in which a correct answer would require KH beyond the minimum necessary to answer a question. One must, to perform successfully on this subtest, manipulate blocks and put them in a certain formation, and it thus tests “the ability to integrate visual and motor processes.” However, there is still a very minimal amount of KH required to manipulate blocks – this is, after all, one of the first activities mastered by infants. And interestingly, this is the first subtest that is labeled a “fairly good measure of $g$” as opposed to an unqualified “good measure of $g$” which is how the first five tests are described. As will be shown, tests that require motor abilities, while they still mostly correlate positively with $g$, have a much weaker correlation with $g$ than test which require propositional knowledge.

7) **Picture Concepts:** “For each Picture Concepts item, the examinee is presented with two or three rows of pictures and chooses one picture from each row to form a group with a common characteristic.” So, in an example provided, the first row has two pictures in it – a raining cloud and a cat – and the second row also has two pictures – a rabbit and a crayon. This subtest “is considered the nonverbal counterpart of Similarities”.

   The correct answer would require knowledge that cats and rabbits are both animals – much as in the Similarities subtest described above (number 2). The KH required for a successful performance is minimal.

8) **Matrix Reasoning:** “For each Matrix Reasoning item, the examinee looks at an incomplete matrix and selects the missing portion from five response items.” The example provided is a 3 X 3 grid and in each of the eight outer squares of the grid is a shape with dots arranged around it in various ways. The center square of the grid is left
While this is a nonverbal test, it nevertheless requires at least some KT for a successful solution. One must know that the correct solution has certain characteristics. It requires no KH beyond what is needed to indicate the correct response.

9) **Picture Completion**: “The Picture Completion task requires the examinee to view a picture and then point to or name the important part missing within a specified time limit.” The example provided is a picture of a car with the front wheel and various other features missing (e.g. door handles, antenna, etc.).

A correct solution would require knowledge that cars have front and back tires, door handles, etc. It requires no KH beyond what is needed to indicate the correct response.

10) **Digit Span**: “The Digit Span subtest is composed of two parts: Digit Span Forward and Digit Span Backward. Digit Span Forward requires the examinee to repeat numbers in the same order as those read aloud by the examiner, and Digit Span Backward requires the examinee to repeat the numbers in the reverse order of that presented by the examiner.”

A good performance on this subtest requires good short term memory as well as things like attention and concentration, but does not require much in the way of either KH or KT.

11) **Letter-Number Sequencing**: “The examinee is read a sequence of numbers and letters, and recalls the numbers in ascending order and the letters in alphabetical order.”

Again, this is primarily a memory test that does require other cognitive skills, but does not seem to require the possession of much KH or KT (though of course one must know that ‘a’ is the first letter, ‘b’ is the second letter, etc.).

12) **Coding**: The examinee copies symbols that are paired with simple geometric shapes or numbers. Using a key, the examinee draws each symbol in its corresponding shape or box within a specified time limit.” In the example given, the number 1 is paired with a square, the number two is paired with a diamond, the number three is paired with two parallel vertical lines, the number four is paired with a right angle, the number five is paired with a triangle and the number six is paired with a diagonal line. Below these pairings is a long string of shapes (22 in all) and the examinee must fill in, below each shape, the number associated with that shape.

This subtest requires knowledge that such-and-such a shape is associated with such-and-such number. It does not require KH beyond what is necessary to fill in the answers.

13) **Symbol Search**: “The examinee scans a search group and indicates whether the target symbol(s) matches any of the symbols in the search group within a specified time limit.” In the example given, there is a row of symbols (e.g. triangles, hexagons, stars, curved lines, etc.). At the far left of the row are the two target symbols and to the right of them are 10 additional symbols that the examinee must scan in order to determine if
either of the target symbols is among them. The examinee must then check the “yes” or “no” box depending upon whether or not he has found either of the targets among the rest of the symbols.

Successful performance on this subtest seems to require little in the way of KH or KT. One must, of course, recognize that a symbol reappears and one must know how to indicate a response. But neither of these things requires much in the way of either kind of knowledge.

14) Cancellation: “The examinee scans both a random and structured arrangement of pictures and marks target pictures within a specified time limit.” No example of this task is given, but presumably it is similar to the Symbol Search task in that one searches for pictures given in the structured arrangement among the pictures given in the random arrangement and marks the ones that reappear.

As with the Symbol Search task, this subtest does not seem to heavily tax either KH or KT.

15) Arithmetic: “The examinee mentally solves a series of orally presented arithmetic problems within a specified time limit. Items were developed to increase the working memory demands while simultaneously making the mathematical knowledge required to complete the subtest task more age-appropriate...the difficulty of the mathematical calculation was set very low, so that most examinees can solve the problems correctly if they are presented the problem visually with numbers directly.”

Successful completion of this subtest requires both KH and KT. One must know that certain words correspond to certain operations. Additionally, one must know how to perform those operations. Mathematical KH does correlate strongly with g. This will be discussed in more detail below.

The above subtests are all from the Wechsler intelligence scale for children. The adult scale leaves out the Word Reasoning and Picture Concepts subtests but adds a Picture Arrangement and (optional) Object Assembly subtest. In the Picture Arrangement subtest “(t)he examinee is presented with a set of picture cards that tell a story in a specified order and asked to rearrange the cards into a logical sequence within the specified time limit.” Successful completion of this task requires both KT and KH since one must know that certain pictures stand for certain objects/events and that some sorts of things happen before/after other sorts of things, etc. It also requires knowledge how to arrange pictures so as to tell a coherent story, which is presumably not a trivial case of KH. It is also not a paradigm case of KH either – one which involves
propriception, focused rehearsal, etc. Non-paradigm cases of KH will be discussed in more detail below.

In the **Object Assembly** subtest, “the examinee fits the pieces of a puzzle together to form a meaningful whole within specified time limits.” No examples or further details are given so it is not clear whether such puzzles are two-dimensional, like jigsaw puzzles with pictures on them, or three-dimensional, like building blocks. Nevertheless, it seems fair to say that this is the task that would most significantly test KH, since it requires motor skills, coordination and proprioception. Still, these requirements are minimal when compared to paradigm cases of KH such as riding a bicycle or typing on a keyboard. And interestingly, this test is only a “fair measure of g for most age groups” compared to most of the other subtests, which are labeled good measures of g.

It is clear, then, that successful performance on the WISC-IV, one of the most popular measures of intelligence in the world, requires very little in the way of the application of KH. While these scales are clearly not intended as direct tests of KH or KT (and in fact, some of the subtests require little of either kind of knowledge), they nevertheless do require the application of significant amounts of KT while requiring very minimal amounts of KH. It seems clearly possible that one could have strong aptitudes for certain kinds of KH and yet perform very poorly on this sort of intelligence test.

The Stanford-Binet Intelligence Scales, fifth edition (SB5) are comparable to the Wechsler scales, though there are significant differences.\footnote{50} SB5 has 10 subtests and focuses more on nonverbal tasks than WISC-IV\footnote{51}. Indeed half of the SB5 subtests are nonverbal tasks (i.e. they require pointing, using gestures, putting things together with one’s hands, etc.). Such

\footnote{50} The information on the Stanford-Binet, 5\textsuperscript{th} edition that follows is taken from Roid and Pomplun (2005).
\footnote{51} This shift to nonverbal tasks is widespread, though, and is due to the recognition of certain impairments that affect linguistic abilities but not necessarily all cognitive abilities.
subtests might seem to require more KH than verbal subtests (since they involve, to some degree, motor behavior), but it is not clear that this is the case, since vocalizing language also requires such behavior and both sorts of abilities are acquired at a very early age.

4.5 Intelligence and KH

I have attempted to demonstrate above that success on modern intelligence tests is closely related to acquisition and possession of KT and requires little in the way of KH. Nevertheless, it might still be predicted – especially by someone who believes that KH just is a form of KT (or who believes that KH reduces to KT) – that IQ scores will correlate strongly with the acquisition and possession of KH as well, even if intelligence tests do not directly require demonstrations of KH. Put another way, if someone believes that intelligence tests reveal basic abilities with regard to the acquisition and retention of propositional knowledge, and one further believes that KH is a kind of propositional knowledge, then one might well conclude that intelligence tests will reveal aptitudes for the acquisition and retention of KH. The test of this conclusion would be relatively straightforward, in principle at least; simply determine if those who do well on intelligence tests also tend to perform well on KH-type tasks. To put it a bit more crudely, do Mensa members make the best jugglers and bicycle riders? Intuitively, it seems unlikely. But does the empirical evidence support this intuition?

Much less work has been done on this subject than you might think, yet there is relatively strong empirical evidence for thinking that one’s membership in Mensa will tell us little about how well one will learn how to ride a bicycle or learn how to juggle. That is, abilities related to KH-type tasks is to a large extent independent of the “intelligence” tested by modern intelligence tasks. Note the qualifier “largely” in the previous sentences. As will be explained below, there are positive correlations between general intelligence and performance on KH-type tasks. And
this correlation is relatively strong when one is first beginning to learn a new KH-type skill. This is as to be expected since (a) both KH-type tasks and KT-type tasks are cognitive and so it is not surprising that general intelligence would have some relation to both; (b) few skills or abilities are “pure” in that they only require KT or only require KH. Most activities require both kinds of knowledge. Nevertheless, the differences in KH-intelligence and KT-intelligence are wide enough to support the conclusion that we are dealing with distinct kinds of knowledge.

So what exactly is the relation between general intelligence \((g)\) and skills and abilities typically associated with KH? In research on complex motor skills “such as riding a bicycle, typing or word processing, using hand tools, and, presumably, cooking a meal from a recipe,” psychologist Phillip L. Ackerman has considered the question of how performance on such tasks relates to one’s “cognitive-intellectual abilities.”\(^52\) He notes that “recent theories of learning and the structure of knowledge…have convincingly pointed to a distinction between knowledge about something – declarative knowledge – and knowledge of how to do something – procedural knowledge.”\(^53\) He also notes that complex motor skills (which are defined as learned behaviors in which “goal attainment is importantly dependent upon motor behavior”\(^54\)) are generally learned in three stages, typically called: (1) the cognitive phase; (2) the associative phase; and (3) the autonomous stage.\(^55\) Each stage will be described briefly below, but notice the similarity to our intuitive ideas about acquiring KH described in Chapter 2 above.\(^56\) This intuitive picture, though sharpened by empirical research, has been largely confirmed by psychologists who study learning processes.

\(^52\) Ackerman (1989), pp. 166-7.
\(^53\) Ibid, p. 166, emphasis in the original. Ackerman cites two works by J.R. Anderson in support of this claim, Anderson (1983a and 1983b).
\(^54\) Ibid, p. 166. Ackerman is using a definition first introduced in Adams (1987).
\(^55\) This three-stage model was first proposed in Fitts and Posner (1967). These stages or phases sometimes go by different names, but the general description of each stage is relatively constant.
\(^56\) Including the ideas that KH-acquisition is a process which takes place over time and which can be done, in later stages, “without thinking”. See, especially, Chapter 2, Section 2.2.6.
The first stage of acquiring a complex skill is, involves, as its name suggests, “all of the requisite memory and reasoning processes that allow the learner to attain an understanding of the task requirements…and frequently includes instruction of declarative knowledge about the task.” So for example if one is going to learn how to drive a car, the first stage is going to involve instruction of what certain terms (e.g. clutch, gearshift, brake pedal, etc.) mean and/or refer to, as well as where such things are located, what they do, and how they are operated. Similarly, if one is beginning a new job that requires complex motor skills, one is first given factual and normative information about the task(s) and its purpose(s). For example, an assembly line worker might be told that she starts and stops the conveyor belt by pushing a certain button, that the goal of the job is to do so much piecework per hour (or day or week), that employing certain strategies is more effective than others, etc. Note that this first stage of complex skill acquisition can begin before any actual contact with the task begins (i.e. it can begin in a classroom or with an instruction manual) and it ends when “the learner has come to an adequate cognitive representation of the task” (my italics). Generally, one has begun hands-on experience in the first phase, but “performance is slow and error prone” and “when confronted with additional information-processing requirements [at this stage]…learners are unable to adequately devote attention to the secondary task and to the learning of the criterion task simultaneously.” The first stage, then, coincides largely with the “training” period in tasks in which that term is appropriate.

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58 Though not in the procedural sense of “how”. That is, at this stage one might learn how the gearshift works by being told that it moves up and down when the clutch is engaged.
59 Ackerman (1989), p. 175. The borders between stages are not bright lines but rough approximations. As Ackerman notes, there is general agreement that “skill acquisition is ordinarily a continuous process, without breaks or discontinuities in performance improvement” (pp. 174-5).
60 Ibid, p. 175.
During the second stage of complex skill acquisition (CSA) – the associative stage – one gets more and more practice performing the relevant tasks and thus “performance speed and accuracy markedly improve.” Additionally,

During the associative phase of skill acquisition, learners put together (compile) the sequences of cognitive and motor processes required to perform the task. As various methods for simplifying or streamlining the task are tried and evaluated, performance generally becomes faster and less error prone than in the cognitive phase. Furthermore, the cognitive load on the learner is reduced as the goals and procedures are moved from short-term or working memory to long-term memory. When a secondary task is added during the associative phase, criterion task performance may not improve to the same degree as under single task conditions, but the criterion skill is less susceptible to interference from external attention demands.\(^\text{61}\)

The second phase, then, corresponds to what we intuitively think of as the “practice makes perfect” stage. The car-driving student, at this stage, has learned how to coordinate the clutch and the gearshift. The assembly-line worker at this stage has come much closer to achieving her piecework goals, and can even think about a bit about what she will be doing after work without significantly affecting her performance.

During the final phase of CSA – the autonomous phase – one’s performance, as the name suggests, becomes “automatic”. It is at this stage when we speak of someone as being able to do something “without even thinking about it.” Ackerman notes that “the final, autonomous, phase of skill acquisition is reached when the learner has essentially automatized the skill and the task can be efficiently performed with little attention.” He continues:

During phase 3, the skill has been internalized such that once a stimulus is presented, the responses can often be prepared and executed without conscious mediation by the learner. After a substantial amount of consistent task practice, skilled performance becomes fast and accurate, and the task can often be performed with minimal impairment while attention is also being devoted to a secondary task.\(^\text{62}\)

\(^{61}\) Ibid, p. 175-6.
\(^{62}\) Ibid, p. 176.
At this stage, then, the car driver can listen to the radio and carry on a conversation with a passenger without much effect on driving ability; and the assembly worker can meet her goals easily, even while daydreaming about her weekend plans.

It is when someone has reached this third phase with respect to some complex skill that we are most likely to ascribe knowledge-how to that person. One reason that Ryle’s observations about KH-acquisition being partial and vague\textsuperscript{63} are intuitively plausible is because CSA takes place via this three-stage process and the lines between the stages are not bright. So if one is partway through the associative phase of learning how to drive a car, we might still be reluctant to ascribe knowledge of how to drive a care to that person (and so if someone asked us whether such a person “knows how to drive” we might respond with “kind of” or “to some extent”). Once the driver is well into the third phase, however, it would seem odd to withhold such an ascription.

The above process of CSA is necessarily oversimplified. Not all examples of complex skill learning follow these steps – for example, tasks that are “inconsistent” (i.e. tasks in which “inputs and outputs” are not “unvarying or consistent from one instance to another”) will not necessarily follow this pattern. If the assembly-line worker is dealing with different products everyday, or different speeds of production, then it is possible that she will not ever reach the stage of automatization. Consistency, then, seems like a “necessary condition for the development of skilled performance” and “in highly complex tasks where the consistency of input and output may not be grasped by the learner, skilled performance is not ordinarily achieved.”\textsuperscript{64} This, perhaps, is why some fields lack reliable experts and it might help to resolve

\textsuperscript{63} E.g. Ryle (1949), p. 59.  
\textsuperscript{64} Ackerman (1989), p. 172.
the Socratic puzzle about why there are no “moral” experts in the same way that there are expert craftsmen.\footnote{Raised, among other places, in \textit{Meno} (91a – 95a) and \textit{Protagoras} (319b-320c)}

So an inconsistent task can block acquisition of KH. But it should also be noted that \textit{all} skills are inconsistent to some extent. The car driver is constantly dealing with new situations that have not been faced before (varying road conditions, mechanical problems, etc.); and the same can be said for the assembly-line worker. So the claim about consistency being a necessary condition for CSA needs to be qualified accordingly. An additional qualification about individual performances is also, perhaps, worth noting. That is, different individuals will likely proceed through this three-stage process at different speeds – and for highly complex tasks, it is likely that significant numbers of people will not reach the end of the process. Some assembly-line workers may never accomplish the goals that have been set and some people will never automatize the process of driving a car. This brings us to the central question of this chapter – whether or not the individual differences just mentioned correlate with other sorts of characteristics – especially the characteristic of general intelligence, which is highly correlated with acquisition and retention of KT.

Some have argued that general intelligence, $g$, is in fact a strong predictor of performance of complex skills – the strongest predictor, in fact. This claim is generally founded on data that shows that intelligence tests are highly correlated with one’s performance during the \textit{training} period of learning a complex skill; that is, during the first (cognitive) phase of this three-stage process. And it is true that the first stage “broad intellectual abilities” are important. That is because at this stage one is largely dealing with propositional knowledge related to the skill that one is learning. It should come as no surprise that aptitudes associated with the acquisition and retention of propositional knowledge in general will be of help to someone who is acquiring
propositional knowledge related to a complex skill. And the quicker one learns that the clutch pedal is on the left, that the brake pedal is in the middle, and that the accelerator is on the right, the quicker one is going to proceed through the first stage of the process of learning how to drive. As has been noted at a number of points throughout this dissertation, even paradigm cases of KH, such as knowing how to ride a bicycle, generally require at least some KT as well. In our day-to-day lives, most of our manifestations of knowledge are mixtures of KH and KT. But as will be shown below, one’s aptitudes regarding acquisition and retention of KT become much less important once the hands-on acquisition of a complex motor skill begins.

So, with respect to the first phase of this three-stage process of CSA, “initial performance will be moderately associated with the general ability [g]” and:

…for novel tasks, initial (that is, in the absence of pretreatment practice) individual differences will be determined by the general ability, as well as by task-appropriate broad content abilities such as verbal abilities for tasks that demand processing of semantic material or spatial abilities for tasks that demand figural processing. 66

For example, if people with high IQs and people with low IQs begin to learn a complex skill that neither group has performed before, it is probable that those with high IQs will generally proceed more quickly through the first stage of this process than those with low IQs. However, the advantage decreases as individuals proceed through the stages. “With practice (as phase 1 makes the transition into phase 2), the ability-performance association will attenuate, reaching an asymptote late in practice (which will be dependent on the actual level of inconsistency of the task).”67

During the transition from the cognitive phase to the associative phase of this process, two other abilities become much more important factors in how quickly one proceeds; one is “perceptual speed ability” and the other is “psychomotor ability”. The former factor largely

determines one’s progress through the associative stage (and becomes much less important
during the autonomous stage), while the latter takes over at the end of phase 2 and into stage 3.
These abilities are largely independent of general intelligence, which means that while the high-
IQ group may have jumped ahead in the early stages of CSA (generally speaking), their
advantage shrinks significantly over the next two phases. Those with low IQs but strong
perceptual speed and psychomotor abilities have an advantage with respect to acquiring and
retaining KH than those with high IQs but who are weak with respect to these other abilities.

In the next transition, from the associative stage to the autonomous stage, psychomotor
abilities become even more important and perceptual speed and general cognitive abilities
become less important. Ackerman notes that, “as learners fully proceduralize their knowledge,
psychomotor abilities are most associated with task performance.”68 So by the time the skill
learner reaches the final phase of KH-acquisition, general intellectual abilities will have still less
of an influence on performance and psychomotor abilities will have a stronger influence on
performance. It is important to note that there is still a significant correlation between general
intellectual abilities and complex motor skills even at this final stage of CSA. Nevertheless, the
correlation is much less significant at the final stage than at the beginning stage and it becomes
overshadowed by the importance of other abilities that are relatively independent of general
intellectual ability. The graph below illustrates the different stages in Ackerman’s model:

68 Ackerman (1990), p. 887.
Ackerman tested his three-phase theory, roughly, as follows. First, he tested subjects’ various abilities using common tests for those abilities. So, general intellectual ability was measured using four tests that indicate g; perceptual speed ability was measured using three tests typically thought to indicate this ability (e.g. “subjects must match a letter/number pair on a test sheet with an identical pair on a response sheet” within a specific (short) amount of time); and psychomotor abilities were tested using tasks thought to indicate that ability (typically involving

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69 Or, in cases where he investigated the past results of others, he relied on the published findings of others who proceeded similarly.

70 Ackerman (1990), p. 900.
measuring response times to various stimuli). These scores were then compared, using a variety of statistical methods such as factor analysis, to subjects’ abilities to learn complex tasks. That is, subjects were observed going through these stages of CSA and the results were compared with the results of subjects’ pre-task test scores. This sort of comparison allowed Ackerman to determine which abilities were of importance at each stage of CSA and how much significance each kind of ability had.

One such task that Ackerman utilized – the Kanfer-Ackerman Air Traffic Controller task (ATC) – involves (not surprisingly) learning some basic skills involved in being an air traffic controller. Ackerman briefly describes some elements of the task:

…the following task elements are displayed when subjects perform the task: (a) four runways, (b) 12 hold-pattern positions, and (c) a queue stack with planes requesting permission to enter the hold pattern. Two runways run north-south; two runways run east-west. One north-south and one east-west runway are short; the other two are long. The hold pattern…is divided into three levels…Four positions, corresponding to the points of the compass…are available in each level.71

Ultimately, in considering the data from this experiment, Ackerman found that “the predictions relating to ability determinants of individual differences in skill acquisition [based on Ackerman’s three-phase model]…were generally consistent with the obtained data…”72 Other support for Ackerman’s theory came from evaluation of previous experiments done by other psychologists and by consideration of other sorts of tasks (generally not as complex as the ATC).

So, Ackerman’s theory – that general intellectual ability decreases in importance as one becomes proficient at a complex motor task while other abilities become more important – was “supported by reanalysis of earlier data…and by a series of experiments with simple information-processing tasks…[and] one experiment (ATC)…[that] had a moderate level of

71 Ackerman (1990), p. 889.
72 Ibid, p. 898.
complexity.”73 Ackerman has continued to investigate and test this model with new technologies and in light of new data and evidence. Specifically, he had concerns about the sorts of tests he (and others) had been using to evaluate (a) general perceptual speed ability, and (b) general psychomotor ability. With respect to (a), further research called into question the sorts of tests Ackerman had used to measure this ability; and with regard to (b), new technologies were making it easier to measure this ability more quickly and accurately. In light of these sorts of concerns, Ackerman performed a number of experiments to re-evaluate his theory. These new experiments tended to confirm that “g still plays an important role in predicting individual differences in task performance, even after extended task practice”, but also that there are “changing contributions of general and psychomotor abilities in predicting task performance over skill acquisition trials.”74 And while these newer experiments caused Ackerman to re-think some aspects of his theory (mostly related to Perceptual Speed measurements and the overall pattern of change over the course of CSA), he concluded that “the psychomotor measures still provided significant incremental prediction over these other ability groups for final ATC task performance (an additional 14.7% of the variance over general and PS abilities).”75

There are other theories about what sorts of abilities are relevant to complex skill acquisition.76 However, differences often boil down to disagreements about the degree to which various factors affect performance at various stages of CSA. The general view that g plays a large role in the early stages of complex skill acquisition and a diminished role in later stages is relatively uncontroversial, as is the view that psychomotor abilities play an increasingly

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74 Ibid, p. 266.
75 Ibid, p. 288.
76 For example, Fleishman (1972) argued that general intellectual ability (g) has no influence on CSA after the initial stages, while Kyllonen and Christal (1989) argue that other factors besides g, Perceptual Abilities and Psychomotor Abilities play a role in CSA.
significant role in determining one’s performance at later stages of this process. Everyone
concedes that the domain of general intellectual ability has been much more thoroughly
investigated and tested than the domain of psychomotor abilities (as well as other ability
domains) which no doubt accounts for some of the disagreement between competing theories.

The disagreement between competing theories, however, does not affect my general
argument, which goes as follows:

P1) If KH is a kind of, or species of (or reduces to) KT, then the kind of intelligence (or
intellectual ability) required for acquisition of KH and KT should be similar.
P2) However, the tests used to measure general intellectual ability (g) require (for
success) lots of KT but very little KH, as demonstrated by direct examination of such
tests. So, in that sense, g is a good measure of the ability to acquire and retain KT, but
not a good measure of the ability to acquire and retain KH.
P3) Furthermore, studies of the acquisition of KH show that while general intellectual
ability plays a significant role in early stages of the process, it plays a much smaller role
in the final stages of the process, in which KH is actually acquired (from the discussion
above).
P4) Thus (from P2 and P3), g is strongly related to the acquisition of KT but plays a
much less significant role in acquisition of KH (alternatively, psychomotor abilities play
a large role in acquisition of much KH but little role in the acquisition of KT – a well-
established conclusion not directly discussed here).
P5) So (from P4), it is not the case that the kind of intelligence related to the acquisition
of KT is the same as what is required for the the acquisition of KH.

Conclusion (from P1, P5 and Modus Tollens): It is not the case that KH is a kind of, or
species of (or reduces to) KT.

4.6 Conclusion

Considerations related to intelligence provide further evidence in support of the
conclusion that KH and KT are distinct kinds of knowledge. They also provide support for a
number of other aspects of the folk theory of KH, developed in Chapter 2, such as the notion that
acquisition of KH is often the result of an extended process that goes through a number of
different stages; and the idea that many (perhaps most) instances of KH involve some KT, even
if they are not dependent upon one another.
It should be pointed out that, given the neurological results reported in Chapter 3, it should not be too surprising to find differences in intelligence and aptitude with respect to KH and KT. If KH and KT are the results of distinct neural subsystems, as I argue in that earlier chapter, then it is plausible to expect differences in performance with respect to those subsystems.

In the final chapter of the dissertation, I put forward an account of KH (and its relation to KT) that focuses on the functional roles of associated mental states. KT states, I argue, are functionally representational. To have a bit of KT is to have an accurate map, or picture of the world – or some part of it. KH states, on the other hand, are not functionally representational, though they may include, or be closely connected to, representations. KH states are functionally practical, or action-oriented. They enable us to do things.

On this functionalist account, it makes perfect sense to for KH and KT to arise from distinct neural substrates, since they serve different functions. And it is completely reasonable to expect differences in aptitude as well – since it is to be expected that individuals will differ with respect to how they perform different kinds of tasks. However, the functionalist account of KH can also make sense of the overlap between the two kinds of knowledge seen, for example, in Ackerman’s three-stage process. It is generally useful, when performing an action, to have a representation of the relevant field of action. Having lots of KT with respect to bicycle riding, for example, is useful – and it can make my acquisition of knowledge-how to ride a bicycle more efficient, even if, strictly speaking, it is not absolutely necessary. Similarly, going back to Chapter 3, Henry M. was capable of acquiring KH with respect to a number of skills and abilities in the absence of the relevant KT – but he generally progressed more slowly through the stages than “normal” controls. It is reasonable to infer that his lack of the relevant KT hampered, but
did not absolutely prevent, his acquisition of KH. Accounts of knowledge that see KH as reducing to, or as a species of, KT have a harder time explaining these sorts of results.

In the next chapter, I look closely at one particular account of KH in which KH is seen as a species of KT. This account, proposed by Stanley and Williamson in their 2001 article “Knowing How”, has reignited the debate about KH that was relatively inactive since Ryle.\textsuperscript{77} Stanley and Williamson argue that KH is a species of KT, and they base their conclusion on syntactic and semantic analyses of knowledge ascriptions. On their account, what I have been pointing to as distinct kinds of knowledge would likely be interpreted as distinct kinds of KT. However, I argue that their account is deeply problematic for a number of reasons, including its methodological assumptions and its substantive conclusions.

\textsuperscript{77} Stanley and Williamson (2001).
Chapter 5: Stanley and Williamson on Knowing-How

5.1 Introduction

Jason Stanley and Timothy Williamson’s 2001 *Journal of Philosophy* article, “Knowing How” has been hugely influential with respect to the titular topic, and has inspired much recent work on the subject. Despite its relatively short length (33 pages), it is quite rich and covers a lot of ground – from a critique of Gilbert Ryle’s account of knowing-how (hereafter, KH); to discussions of the syntax and semantics of knowledge ascriptions; to a thorough defense of their own positive view of KH (and its relation to propositional knowledge). Stanley and Williamson ultimately conclude that KH is a species of propositional knowledge, or knowledge-that (hereafter, KT) – a view that sometimes goes by the name Intellectualism.

In this part of the dissertation, I provide a critical discussion of Stanley and Williamson’s account of KH. I discuss some significant problems with their account of KH below, including problems with their discussion of the relation between KH and abilities, problems with their syntactic and semantic analyses, problems with some of the machinery they introduce in defense of their account, and a general methodological problem stemming from their focus on linguistic analyses in reaching their conclusion.

5.2 Critique of Ryle’s Positive Account of Knowing How

Before discussing Stanley and Williamson’s positive account of KH, I address their critique of Ryle’s account of KH. This is for two reasons: first, because some of the plausibility of their account rests on the claims they make about the relation between KH and ability in criticizing Ryle’s account; second, Ryle’s account bears some important similarities to my own account, presented in the next chapter, so it is useful for me to say a bit here about why their critique of Ryle is problematic.
Early in their article, Stanley and Williamson discuss Ryle and his work on KH. They consider, and convincingly undermine, Ryle’s claim that Intellectualism – the view that KH reduces to, or is a kind of, KT – is necessarily subject to problems involving infinite regresses. They also consider and reject Ryle’s positive, dispositional, account of KH. They provide a succinct, one-paragraph presentation and rebuttal of Ryle’s view:

Let us turn to (Ryle’s) positive account of knowledge-how. According to Ryle, an ascription of the form 'x knows how to F' merely ascribes to x the ability to F. It is simply false, however, that ascriptions of knowledge-how ascribe abilities. As Ginet and others have pointed out, ascriptions of knowledge-how do not even entail ascriptions of the corresponding abilities. For example, a ski instructor may know how to perform a certain complex stunt, without being able to perform it herself. Similarly, a master pianist who loses both of her arms in a tragic car accident still knows how to play the piano. But she has lost her ability to do so. It follows that Ryle’s own positive account of knowledge-how is demonstrably false.¹

However, the second and third sentences of that paragraph are arguable. With respect to the second sentence, Ryle does not equate knowing how with merely having an ability. He equates knowing how with having a complex disposition. Ryle writes: “knowing how, then, is a disposition, but not a single-track disposition like a reflex or a habit.”²

What difference does this make? Well, dispositions are behaviors or abilities that are manifested under certain, but not all, circumstances. To say that salt is disposed to dissolve in water does not entail that some salt is now dissolving in water, or that salt will always dissolve in water. Perhaps, for example, there is some third substance that could be added to the water that would prevent the salt from dissolving. Similarly, to say that the glass is fragile is not to say that the glass is breaking right now, or that it will break under any stress at all.³ In other words, the tendency to behave in the way described by the disposition-ascription is defeasible. A Rylean

² Ryle (1949), p. 46.
³ Ryle emphasizes the distinction between KH and these other types of simple, single-track dispositions (i.e. solubility and fragility), but they are suitable examples for my present purpose.
could make the same sort of point about the examples Stanley and Williamson give in the quoted paragraph above. One might argue that to ascribe to someone knowledge of how to play the piano, for example, is to say that she has the ability to play piano under certain circumstances. In the case of the injured piano player, however, those circumstances do not exist. The tendency to behave in the way ascribed to the piano player has been defeated. But that defeat no more undermines the dispositional claim than a dissolution-prevention substance would undermine the claim about the solubility of salt.

The third sentence above – “It is simply false, however, that ascriptions of knowledge-how ascribe abilities” – is problematic for reasons related to the problem with the second sentence. Namely, it is possible for someone to have an ability but to not be able to presently exercise the ability, due to the presence of defeaters. So, while it might be true that ascriptions of knowledge-how do not necessarily imply present abilities, they do generally imply having had an ability at some point, or under certain circumstances. Consider the following examples:

(1) A patient faced with heart surgery asks his doctor whether she is the right person to perform his bypass operation. The doctor replies, “Believe me, I know how to do this surgery better than anyone.”

(2) A foreign language teacher asks her students if any of them already know how to speak a foreign language. One student replies that she knows how to speak French. When the teacher asks her to say something in French, the student replies that while she knows how to speak French, she is unable to do so.

In example (1), the doctor ascribes KH to herself, and certainly implies that she has the relevant ability. Example (2) is also meant to illustrate an example of KH that seems to entail an ability – in this case, by demonstrating the implausibility of ascribing KH while lacking the corresponding ability.

Now, it is possible that the implication in (1) is conversational, and one can imagine the doctor following up by saying, for example, “I will not be the one actually performing the
surgery because I injured my hand, but since I know how to perform this operation better than anyone, I will be advising during your surgery.” But this still implies that the doctor had the ability to do the surgery before the hand injury (and will, presumably, have it again after the injury heals). And while (2) seems to contain an even stronger implication of ability, it could presumably still be defeated by an evil demon type scenario (e.g. whenever she tries to speak French, the evil demon prevents it). But, again, the implication is that she had the ability at some point, and would have it again in the absence of defeaters.

Here are a number of similar examples:

(3) A guitar teacher tells his student, “by the time our lessons together are over, you’ll know how to play guitar as well as I do.”

(4) An ophthalmology office advertises: “All of our doctors know how to perform Lasik eye surgery.”

(5) Man #1: “I’ll bet you $100 that I know how to juggle.
   Man #2: OK, I’ll take that bet….Well, go ahead, let me see you juggle.
   Man #1: I never claimed I had the ability to juggle, only that I knew how.

(6) My dog knows how to catch a Frisbee.

These all seem like examples in which an ascription of KH strongly implies a dispositional ability (i.e. an ability in the absence of defeaters), even if it does not entail a present ability.

As further evidence of this point, notice that a natural response to remarks such as:

   (i) I know how to juggle, but I cannot do it.
   (ii) I know how to speak French but I am unable to.

would be a request for further explanation, such as:

   (i*) Why not?
   (ii*) What do you mean?

where what is being requested is plausibly seen as an explanation of the defeater that is preventing the connection between KH and ability. For example:
(i**) I hurt my arm.
(ii**) I am too shy.

If a plausible defeater is not invoked, skepticism about the truth of the knowledge ascription would not be uncommon. Furthermore, notice that sentences such as (i) and (ii) themselves sound a bit unnatural without some qualification, such as:

(i***) I know how to juggle, but I cannot do it right now.
(ii***) I know how to speak French but I am unable to because of my shyness.

So while Stanley and Williamson might be correct with respect to their claim that KH ascriptions need not ascribe present abilities, it is not clear that they have undermined a dispositional account such as Ryle’s.

As noted above, Ryle’s dispositional account is similar, in relevant ways, to my account of KH, called KH Functionalism. I argue that KH states (e.g. knowing how to ride a bicycle) should be characterized functionally – in terms of the inputs that give rise to them, the connections they have to other mental states, and the outputs that they generally lead to. The outputs of a KH state will generally involve the exercise of the relevant ability, but as in Ryle’s dispositional account, the typical outputs might fail to occur, due to defeaters. Just as the mental state of pain typically, but does not necessarily, lead to such behaviors as shouting, cursing, etc., so the mental state of knowing how to ride a bicycle will tend to, but not necessarily, lead to exercises of the ability to ride a bicycle. The fact that KH ascriptions do not entail the present ability to, for example, ride a bicycle does not undermine KH Functionalism for the same reason it does not undermine Ryle’s dispositionalism.

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4 For example, if the alleged juggler said “I just don’t feel like juggling right now”, his knowledge might be questioned.

5 I employ the traditional model for functional characterizations of mental states. The textbook example is pain – which is functionally characterized as a state that arises from bodily trauma, connects to other mental states (such as fear, anxiety, desire for relief), and leads to behaviors such as yelling, saying “ouch”, etc.
In addition to the two problems discussed above, there is a third problem with Stanley and Williamson’s argument against Ryle’s positive account of KH which relates to the methodology they employ. Here is the rest of that paragraph against Ryle:

For example, a ski instructor may know how to perform a certain complex stunt, without being able to perform it herself. Similarly, a master pianist who loses both of her arms in a tragic car accident still knows how to play the piano. But she has lost her ability to do so. It follows that Ryle's own positive account of knowledge-how is demonstrably false.

The phrases “it follows” and “demonstrably false” are strong, implying something like a proof. But the proof depends only upon the plausibility of ascribing KH in two examples – a pianist who can no longer play due to an injury, and an instructor who knows how to do something but cannot actually do it. But who says that the pianist still knows how to play the piano after her injury? What should we say to someone who insists that the pianist used to know how to play the piano, but no longer does? And how should we respond to someone who rejects the claim that the ski instructor knows how to perform the complex stunt, given that she cannot perform it; or the person who wants more details about the situation before rendering a verdict (e.g. how close can the ski instructor actually come to performing the complex stunt)? The only response suggested in the above paragraph is an appeal to intuitions about when we should and should not ascribe KH.

And even if such an appeal went unanimously in Stanley and Williamson’s favor – e.g. we find in a poll that people universally ascribe KH as they claim in these examples – there is still the possibility that such people are wrong to do so. Perhaps they are just wrong about the nature of KH, and they could be made to see that if they were exposed to a well-supported theory

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6 Noë (2005) is skeptical about such examples (p. 283-4), though Bengson, Moffett and Wright (2009, pp. 5-6) commissioned a poll that found a large percentage of people do, in fact, agree that the ski instructor in this example knows how to do the stunt, despite her inability to do it. I discuss such examples in more detail in Chapter 6, where I provide a Functionalist account of KH.
that indicates their mistake. It is not unheard of for people to have intuitions about the nature of some phenomenon that turn out to be false. For example, space does not intuitively seem like the kind of thing that could be curved. And colors, intuitively, are objective properties of the objects they inhere in.

In short, Stanley and Williamson’s demonstration relies on an appeal to intuitions about a few examples of knowledge ascriptions in atypical cases – intuitions that not everyone might share. Appeals to intuitions have their place in philosophical inquiry, of course, and I appeal to intuitions myself throughout the chapter (and dissertation). But caution should be taken about reaching substantive conclusions based on intuitions with respect to a relatively small number of atypical cases. It would be like citing some examples in which people ascribe good feelings to painful experiences (e.g. “it hurts so good!”) and thereby concluding that since pain does not always directly entail bad feelings, there is no strong connection between being in pain and feeling bad.

One additional point on this topic: the same strategy that Stanley and Williamson use against Ryle could be used against their own account of KH, an account which implies that there is never a KH-ability entailment. For example, it has been argued that certain KH ascriptions do, in fact, entail abilities. If some examples were discovered of situations in which universally shared intuitions indicated a KH-ability entailment, would that be sufficient to undermine Stanley and Williamson’s account? Presumably, stronger counterarguments would be required.

5.3 Other Arguments Against Intellectualism: The Linguistic Turn

Stanley and Williamson next note that there are arguments against Intellectualism that do not rely on Ryle’s regress. They point to philosopher David Carr as someone who notes that,

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7 See, for example, Bengson and Moffett (2007), p. 32. They argue, for example, that a sentence such as “Irina knows how to add” entails “Irina is able to add”.

“knowledge-how is a fundamentally different relation from knowledge-that,” and who bases this conclusion on the claim that, “the grammatical objects of ascriptions of knowledge-how, unlike ascriptions of knowledge-that, are…nonsentential; the former do not ascribe propositional knowledge” (417). Carr differentiates himself from Ryle, according to Stanley and Williamson, since, “Carr is quite clear that ascriptions of knowledge-how also do not ascribe abilities to agents.” It is not entirely clear that Carr divorces KH ascriptions from ability ascriptions in the way that Stanley and Williamson claim, however. Here is Carr’s account of KH:

A knows how to φ only if:
1. A may entertain φing as a purpose
2. A is acquainted with a set of practical procedures necessary for successful φing
3. A exhibits recognisable success at φing

That third condition seems to require that in order to ascribe KH to a subject, that subject must have the (qualified) ability to φ. That is, to exhibit recognizable success at doing something, one must, at least at some point, have the ability to do it. Perhaps one need not have the present ability to φ, on Carr’s account, but as I argued above, it is not necessarily the case that Ryle held such a view either. So while Carr definitely objects to Ryle’s dispositionalism, it is not so clear that he differentiates himself from Ryle by rejecting a strong connection between KH and abilities.

They further note that Carr’s account of KH “is…(a) more sophisticated account of the relation between knowledge-how and knowledge-that which we assume should actually underwrite the current consensus that knowledge-how is a fundamentally different relation from

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8 They base their claims about Carr on two of his articles: Carr (1979) and (1981).
10 This requirement seems either too strong (if one must be consciously acquainted with the relevant set of procedures) or trivial (if being acquainted with the practical procedures for doing x just means doing knowing how to do x).
knowledge-that.”

Perhaps this sophistication is attributed, at least in part, because Carr’s methods are similar to Stanley and Williamson’s – that is, they each tend to focus on the analysis of language (especially knowledge ascriptions) to settle questions about KH and its relation to KT. As discussed elsewhere in this dissertation, I take issue with such an approach. But while Stanley and Williamson approve of the general approach (argument by way of analysis of knowledge ascriptions), they ultimately disagree with Carr’s conclusions. They next proceed to explain why by presenting their own account of KH, which they claim will “undermine even these sorts of more sophisticated accounts of the relation between knowledge-how and knowledge-that” such as Carr’s. They challenge Carr’s account, and also derive their own positive account of KH, directly from syntactic and semantic analyses of knowledge ascriptions.

5.4 The Syntax of Knowledge Ascriptions

What is primarily at issue, according to Stanley and Williamson, is the analysis of knowledge ascriptions such as the following:

(2) Hannah knows how to ride a bicycle.
(3) Hannah knows that penguins waddle.

Does a comparative analysis of these two sentences reveal fundamental syntactic and/or semantic differences? On the face of it, yes. A plausible first take on how to analyze these two sentences might be as follows:

(2’) Hannah [S] knows how [P] to ride a bicycle [Obj]
(3’) Hannah [S] knows that [P] penguins waddle [Obj]

The subject [S] of (2) is “Hannah”, the predicate [P] is “knows how”, and the object [Obj] is “to ride a bicycle” (i.e. an infinitive specifying an action). The subject of (3) is “Hannah”, the

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14 For the sake of simplicity, in what follows I will use the examples from Stanley and Williamson (2001), and assign them the same numbers, though examples with asterisks or apostrophes are my own versions of some of their examples.
predicate is “knows that”, and the object is “penguins waddle” (i.e. a sentence). On this reading, the sentences have different objects that correspond to their difference in kind: KH objects are actions, while KT objects are sentences/propositions.

However, this analysis does not hold up, according to Stanley and Williamson. They write that, “although syntactic frameworks have undergone much change since the early 1970s, none of it has affected the basic analysis of sentences such as (2)” (417). And the basic analysis of sentences such as (2) (i.e. KH ascriptions) is that they are “syntactic counterparts” to what are called “knowledge-wh” (hereafter, K-Wh) ascriptions – that is, ascriptions of “knowledge what,” “knowledge where,” “knowledge when,” “knowledge which,” “knowledge why,” and “knowledge whom”. So KH ascriptions get the same syntactic analysis as the following:

(4)    (a) Hannah knows where to find a nickel.
       (b) Hannah knows whom to call for help in a fire.
       (c) Hannah knows which prize to look for.
       (d) Hannah knows why to vote for Gore.\(^{15}\)

But, a critic might ask, why not break these sentences down like we did in (2’) and (3’) above? That is, we could analyze (4a-d) as follows:

(4)    (a’) Hannah [S] knows [P] to find a nickel [Obj]
       (b’) Hannah [S] knows [P] to call for help in a fire [Obj]

Etc.

To contemplate such an analysis is to begin to see the answer. Especially considering the alternative:

(4)    (a’’) Hannah [S] knows [P] where to find a nickel [Obj]
       (b’’) Hannah [S] knows [P] whom to call for help in a fire [Obj]

Etc.

Comparatively, it seems more intuitively plausible to see the location (“where to find a nickel”) as the object of knowledge in (4a), rather than seeing the infinitive “to find a nickel” as the

object of the predicate “knows where”. Similar points can be made about the other K-Wh ascriptions. Stanley and Williamson also point out that other “how” ascriptions – such as “learn how,” “wonder how,” “ask how,” etc. – are more perspicuously analyzed along the lines of (4a’’-b’’) than along the lines of (4a’-b’). Why, they ask, should we think that “knows how” would be an exception?

5.4.1 How KH Ascriptions are Syntactically Like KT Ascriptions

So if we accept Stanley and Williamson’s claim that KH ascriptions are part of the “K-Wh” ascription family (syntactically speaking), then the analysis of “Hannah knows how to ride a bicycle” (which is number (2) above) changes from:

(2’) Hannah [S] knows how [P] to ride a bicycle [Obj]

to:

(2’’) Hannah [S] knows [P] how to ride a bicycle [Obj]

which undermines the original claim that KH ascriptions take as their object infinitives that specify actions. That is the first step in dismantling linguistic arguments such as Carr’s. But it still has not been established that (2) and (3) are syntactically alike. For even in our revised syntactic analysis of (2), the object of knowledge does not look obviously sentential, as in “Hannah knows that penguins waddle” (number (3) above). In other words, there still appear to be syntactic differences between sentences like (2) and sentences like (3).

And indeed, Stanley and Williamson concede that there are syntactic differences between KT and K-Wh ascriptions. However, these differences are not, ultimately, relevant in distinguishing the two types of knowledge ascription at a fundamental level. The reason K-Wh ascriptions look different from KT ascriptions, they claim, is because K-Wh ascriptions contain

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16 Perhaps, though, KH ascriptions are a special case, and do not really belong in the “K-Wh” family. Stanley and Williamson do not consider this as a viable alternative, and presumably there are strong reasons for classifying these all together. I will say more about potential differences below.
embedded questions in their “clausal complements” (to use Stanley and Williamson’s language). That is, the clausal complements of the above K-Wh ascriptions – i.e. “where to find a nickel,” “whom to call for help in a fire,” “which prize to look for,” “why to vote for Gore,” and “how to ride a bicycle” – are embedded questions. And thus, what Hannah knows, when we ascribe these examples of K-Wh to her, are answers to these embedded questions. And, Stanley and Williamson imply, the answers to such embedded questions ultimately get analyzed sententially. Once that analysis is complete, K-Wh ascriptions look, structurally, like KT ascriptions.

How exactly does this syntactic analysis go? Their discussion gets a bit technical, and it is not very well explained. And it is not clear that this last point, the one about the nature of answers to embedded questions, is a proper part of the syntactic analysis of knowledge ascriptions. But the general point they are making about the syntax of knowledge ascriptions is perhaps easiest to understand with the “K-Wh” ascriptions – for example, (4a), “Hannah knows where to find a nickel.” What exactly does Hannah know, given this ascription? She knows an answer to a (embedded) question: “where can I find a nickel?” How is this sentential, though, if it is a question? Well, what she knows is not the question, but the answer to the question (or, at least, an answer). In other words, if this knowledge is ascribed to Hannah, what she knows is that she can find a nickel in such-and-such a place (say, under the couch). So “Hannah knows where to find a nickel” has the underlying syntactic structure, “Hannah knows that she can find a nickel in location l”, and that latter sentence is structurally analogous to (3), “Hannah knows that penguins waddle”. And since KH ascriptions belong to the K-Wh family, then the same conclusion applies to them. In argument form, then, we get:

(P1) KH ascriptions are, syntactically, part of the K-Wh ascription family.
(P2) K-Wh ascriptions are best interpreted as having sentential objects (or “sentential complements”, as Stanley and Williamson put it).
(P3) KT ascriptions also have sentential complements.
(C1) Therefore, there is no distinction between KT and KH with respect to their objects (i.e. both have sentential complements).
(C2) Thus, Carr’s argument from linguistic differences fails.

5.4.2 Critique of Stanley and Williamson’s Syntactic Analysis

To anticipate my objection to this argument, I am going to challenge the claim that KH ascriptions have sentential objects – which amounts to a challenge to premise (P2) above. One thing to consider, then, is how KH ascriptions end up with sentential complements, according to the account above. Above, I used the example of “Hannah knows where to find a nickel” (which is (4a)) to demonstrate how K-Wh ascriptions get analyzed as having sentential complements.

But how does that same analysis work with respect to a KH ascription, such as “Hannah knows how to ride a bicycle”? Recall that in the former case, we got something like: “Hannah knows that she can find a nickel in location l”, which is a KT ascription. What is the analogous move with respect to the KH ascription?

Stanley and Williamson illustrate how this might work by looking at a related KH ascription: “(5a) Hannah knows how Bill rides a bicycle.” They claim that this sentence, …seems clearly to attribute propositional knowledge to Hannah. As we have seen, from the perspective of syntactic theory, there is no difference between (2) and (5a) which would lead us to think that (2) ascribes nonpropositional knowledge, whereas (5a) ascribes propositional knowledge. The supposed difference has no basis in structure.

So really, Stanley and Williamson give two (related) reasons for thinking that KH ascriptions have sentential complements like KT ascriptions. First, because KH ascriptions are part of the K-Wh family, and instances of the K-Wh family have sentential complements (that is the argument given above). And second (in support of the first) because this related instance of a

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17 Specifically, I will challenge the claim that all K-Wh ascriptions are best interpreted as having sentential objects. At least some KH ascriptions, I will claim, do not.
KH ascription, (5a), “seems clearly to attribute propositional knowledge to Hannah”, therefore, so does the sentence “Hannah knows how to ride a bicycle.”

But is it true that (5a) clearly attributes propositional knowledge to Hannah? What exactly is the proposition that Hannah knows in (5a)? Here is a suggestion: perhaps Bill always rides a bicycle with no hands on the handlebars, and Hannah knows this. So in saying that Hannah knows how Bill rides a bicycle, perhaps the following propositional knowledge is being attributed to Hannah: _Bill rides a bicycle with no hands_. But on this reading of (5a) it does not appear to have the same structure as (2) – i.e. “Hannah knows how to ride a bicycle”. The analogous analysis of (2) would be that “Hannah knows that _she (Hannah) rides a bicycle with no hands_,” and that is pretty clearly not what sentence (2) is saying (on a normal reading). Sentence (2) is not merely ascribing knowledge of a certain style or manner of riding a bicycle to Hannah, as this interpretation of (5a) seems to be doing. So what is the propositional knowledge that Hannah “seems clearly” to have in (5a), and by analogy, in (2)? To address that question, it might be helpful to go back again to the K-Wh examples from above:

(4a) Hannah knows where to find a nickel.
(4b) Hannah knows whom to call for help in a fire.
(4c) Hannah knows which prize to look for.
(4d) Hannah knows why to vote for Gore.

Remember that these constructions have embedded questions and the subjects of these sentences are being ascribed knowledge of an answer to those questions. If we make the embedded question structure explicit, we might get sentences that look like these:

(4a*) Hannah knows an answer to the question: “where do I find a nickel?”
(4b*) Hannah knows an answer to the question: “who do I call for help in a fire?”
(4c*) Hannah knows an answer to the question: “which prize should I look for?”
(4d*) Hannah knows an answer to the question: “why should I vote for Gore?”
Now, consider versions of (4a*-d*) where answers to the questions are filled in, and the
sentential complement is made explicit:

\[(4a**) \text{ Hannah knows that she can find a nickel under the couch.} \]
\[(4b**) \text{ Hannah knows that she should call 911 for help in a fire.} \]
\[(4c**) \text{ Hannah knows that she should look for the most expensive prize.} \]
\[(4d**) \text{ Hannah knows that she should vote for Gore because he’s a Democrat.} \]

So far, so good. But now if we consider the analogous steps with the KH ascription, we get:

\[(2) \text{ Hannah knows how to ride a bicycle} \]
\[(2*) \text{ Hannah knows an answer to the question: “how do I ride a bicycle?”} \]
\[(2**) \text{ Hannah knows that } \underbrace{\text{ }}. \]

But, how do we fill in that blank? Here are some possibilities:

- Hannah knows that she should ride a bicycle carefully.
- Hannah knows that she should ride a bicycle with her feet on the pedals.
- Hannah knows that she should ride a bicycle with enthusiasm.

But these are clearly not the right sorts of answers. Generally if one is ascribing KH one does
not intend anything like the above sentences. Of course, sometimes “how” clauses specify this
sort of thing (a style, or manner) – for example, “Hannah knows how Youkilis holds his bat” –
but not in the sorts of KH claims that we are considering here as paradigmatic.

The fact that there is no obvious way to fill in this blank is suggestive. The rest of the K-
Wh blanks were very easy to fill in, and the answers provided seem completely noncontroversial.

But with KH, we have hit a bit of a bump – a bump that could be some evidence for a
disanalogy. On the other hand, perhaps an obvious candidate (or two) has been overlooked. For
example, perhaps what is required to fill in the KH blank is a description of the core
sentential/propositional knowledge that is required to ride a bicycle:

- Hannah knows that she must put her hands on the handlebars, her feet on the pedals and
  then pedal.
There are problems with this attempted solution, however. For one, it seems perfectly possible for someone to know those core propositions, but still not know how to ride a bicycle. In fact, one could memorize a much more complete list of such propositions by reading a book on bicycle riding – a book that included photos and diagrams illustrating proper posture, foot placement, etc. One could even throw in chapters explaining the physics of bicycle riding. It seems implausible, however, that such a person, given that she has never touched an actual bicycle, would be said to know how to ride a bicycle (though she might be said to know how one rides a bicycle – a very different bit of knowledge); especially if such a person, upon encountering an actual bicycle, fell down before even getting both feet on the pedals.

It might be argued that this objection begs the question in that it assumes that KT alone is insufficient for KH. But the objection (at this point, at least) is not based on any positive theory of KH, but rather on commonsense intuitions about KH ascriptions, which Stanley and Williamson are themselves appealing to. I suppose that they might argue that we would, typically, ascribe knowledge how to ride a bicycle to a person who has read lots of books about bicycle riding, but who consistently falls off actual bicycles – but this is not a common intuition, from what I can tell.

Another potential problem for the “core description” solution exists as well. Just as one might know the core description but not know how to ride a bicycle, so also one might know how to ride a bicycle and lack knowledge of (at least parts of) the core description. In Chapter 3, I discuss an amnesic patient, Henry M., who fits that description (i.e. he knows how to do things, but lacks propositional knowledge with respect to how to do things, even the core things) –

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19 Note the similarity to the know-how solution to Jackson’s knowledge argument against physicalism. That solution gains whatever plausibility it has because of an intuition similar to the one I am referring to here – that one could have lots of relevant propositional knowledge while lacking the corresponding KH. In the next chapter, I go into a bit more detail on this subject, though I ultimately come down against the know-how solution.
though even Henry might know *as he is riding a bicycle* that his feet are on the pedals, his hands on the handlebars, etc.\textsuperscript{20} But there are examples of this sort, at least for some activities, and they do not rely on pathological subjects. Chicken-sexing – which involves determining the sex of young chickens – is commonly used as an example to illustrate this sort of phenomenon. Expert chicken sexers are often unable to say anything at all about how they know the difference between the sexes – yet they separate them with near perfect accuracy.\textsuperscript{21} Even when the method is explained, a chicken-sexer might proclaim ignorance as to whether or not he was using that method. So, again, intuitively, it seems plausible that KH would be ascribed to such chicken-sexers, despite the fact that they lack even basic, or core, propositional knowledge related to their activity.

So, there does seem to be a significant difference, here between the other K-Wh examples and the KH example. While (4a-d\textsuperscript{**}) are plausible and intuitive answers to their respective questions, the candidates that have been considered for (2\textsuperscript{**}) are not like that. If someone told me that there were nickels under the couch, then I could look under the couch, find a nickel, and my question would be answered. But if I want to know how to ride a bicycle, while it might be helpful to know that I should be careful and that I should put both feet on the pedals, I would not thereby acquire knowledge of how to ride a bicycle.

Stanley and Williamson do, ultimately, provide an answer to the question of how to fill in the blank in (2\textsuperscript{**}), which I discuss in detail below. For now, I will point out that their solution is complex, and not at all intuitive. It invokes and invents bells and whistles that need not be invoked to fill in the syntactic blanks for the other members of the K-Wh family. That does not

\textsuperscript{20} Though the KT in such a case might well be said to come *as a result* of the exercise of KH (i.e. as a result of Henry observing himself as he exercises his knowledge how), in which case it would not be what Henry’s KH consists in.

\textsuperscript{21} Horsey (2002)
mean that their solution is wrong, but its complexity is worth noting since we started off with the impression that KH ascriptions were going to fold neatly into the K-Wh family, syntactically speaking. That does not seem to be the case. Even if Stanley and Williamson’s account is correct, it does not fall easily out of a general syntactic analysis of the K-Wh family.

5.4.3 The Problem with the Syntactic Argument

So, how does this problem affect Stanley and Williamson’s syntactic argument? Their argument, again, is that KH ascriptions are part of the K-Wh family, which all have sentential objects. Therefore, KH ascriptions (like KT ascriptions) also have sentential objects, and thus here is no fundamental difference between those two kinds of knowledge. What one knows when one knows how to do something, then, is a true answer (in the form of a sentence/proposition) to the relevant embedded question.

The upshot of what I have claimed above is that there are no obvious, intuitive sentential objects of KH ascriptions. I will consider Stanley and Williamson’s non-obvious, non-intuitive candidate below, but it is worth considering the possibility that the absence of an obvious, intuitive, sentential object for KH ascriptions indicates that KH ascriptions simply do not have sentential objects. This possibility admittedly undermines the hopes for a neat, unifying account of the K-Wh family of ascriptions, but as noted above, that hope has already been somewhat dashed even if we ultimately accept Stanley and Williamson’s account. The absence of sentential objects in KH ascriptions does line up with the intuition that knowing how to do something goes beyond knowing a sentence/proposition, which is an advantage. And it can be readily explained by my account of KH, KH Functionalism, discussed in detail in Chapter 6. According to my account, KH states and KT states serve distinct functional roles – with KT states being functionally representational, while KH states are functionally practical, or action-
oriented. Since propositions are representational entities, it makes perfect sense for KT
ascriptions (and other K-Wh ascriptions) to have sentential/propositional objects. But since KH
serves a non-representational function, we should not expect KH ascriptions to have sentential
objects.

One need not accept KH Functionalism, though, to disagree with Stanley and
Williamson’s conclusion so far. Anti-Intellectualists in general argue that what is being ascribed
in KH ascriptions is not propositional knowledge. So, how specifically can anti-Intellectualists
challenge Stanley and Williamson’s argument? First, they can concede that much of what
Stanley and Williamson say about KH and K-Wh ascriptions is true. They can concede that like
K-Wh ascriptions, KH ascriptions contain embedded questions in their clausal complements.
And they can concede that the answers to those questions are what are being ascribed to the
knowing subjects in such ascriptions. They might then argue that anything beyond that is
beyond the proper scope of syntactic analysis. This is a plausible argument, I believe, since it
does not seem like the proper role of syntactic theory to determine whether or not answers to
“How” questions are propositional or non-propositional. Or, put another way, the disagreement
between Intellectualists and non-Intellectualists does not seem to be merely a disagreement about
syntax. And if that is true, then the source of disagreement is going to come with Stanley and
Williamson’s semantic account of K-Wh ascriptions, rather than their syntactic account.

Additionally, the anti-Intellectualist can point to other examples of K-Wh ascriptions that
include embedded questions whose answers are not obviously sentential/propositional. For
example, consider the following K-Wh ascriptions:

Hannah has fallen heavily for John, and she now knows what love is.
Hannah knows what a symphony sounds like.
Hannah knows how sandpaper feels.
Hannah knows what watermelon tastes like.
Hannah knows what the pain of giving birth is like.

These sentences presumably all fit the syntactic pattern described above: K-Wh ascriptions that include embedded questions in their clausal complements. Thus, what is being ascribed to Hannah in each case is knowledge of the answer(s) to the embedded questions:

Hannah knows the answer to the question: what is love? (or, perhaps, what is it like to be in love?).
Hannah knows the answer to the question: what does a symphony sound like?
Hannah knows the answer to the question: what does sandpaper feel like?
Hannah knows the answer to the question: what does watermelon taste like?
Hannah knows the answer to the question: what does the pain of childbirth feel like?

But are the answers to these questions sentential/propositional? While we can attempt to provide sentences that would describe the above feelings/sensations/emotions – e.g. “sandpaper is rough,” “watermelon is sweet and wet,” etc. – knowing the answer to such questions (e.g. what does watermelon taste like) is not equivalent to knowing these propositions (that watermelon is sweet and wet), since one could know that watermelon is sweet and wet without actually knowing what watermelon tastes like. The actual knowledge of what watermelon tastes like stems from the experience itself, which cannot be fully encapsulated in a proposition(s).22 Or so many philosophers have argued. Have all these debates about qualia been for naught? Have the answers been there all along, in theories about the syntax of K-Wh ascriptions? Perhaps, though it seems unlikely.

There are, after all, other candidates for objects of knowledge apart from propositions. I could, as in the qualia examples cited above, know a taste, or smell, or feeling (pain, love, etc.) directly – by acquaintance. Or I could know (to borrow a term Stanley and Williamson use in their positive account of KH) a way to do something (or a method, or a process – more on this below) – where such an object of knowledge is not a proposition(s). It has also been argued that

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22 A point illustrated by the ubiquitous “tastes like chicken” joke as a response to such questions.
a person can be an object of knowledge.\textsuperscript{23} With respect to KH, a plausible answer to the question, “how do I ride a bicycle?”, will involve a demonstrative: “like this!”, where the “this” indicates all sorts of non-propositional elements, such as balance, posture, position, which must be shown rather than said.

I do not mean to argue here that the qualia examples above are (or are not) examples of KH.\textsuperscript{24} Rather, I am pointing out that it should not be asserted, by syntactic fiat, that all answers to “Wh” questions can be given in sentential/propositional form. Of course many answers to “Wh” questions can be given in such a form, but that in itself is not an argument for the universal claim. To assert this broader claim requires an argument that goes beyond syntactic analysis. Especially given that we should not expect answers to all “Wh” questions to have propositional answers since, again, different questions will call for different ways of answering. If I want to know what watermelon tastes like, or how to ride a bicycle, then a proposition is not going to suffice in providing an answer – I will need direct acquaintance for the former, and practice and rehearsal for the latter. It can be helpful to have relevant representations, and it can go some way towards answering such questions (which is what gives Intellectualist accounts whatever plausibility that they have, I would argue). But ultimately, since what is required to answer all such questions is not a representation, no proposition in itself will be sufficient in conveying such answers.

To summarize, Stanley and Williamson are so far arguing as follows:

P1) K-Wh ascriptions (including KH ascriptions) have clausal complements with embedded questions.

P2) Subjects of K-Wh ascriptions (including subjects of KH ascriptions) are being ascribed knowledge of answers to the embedded questions in the

\textsuperscript{23} See, for example, Dalmiya (2001).

\textsuperscript{24} Though some do – including Stanley and Williamson (and since KH is a species of KT, they argue that what Mary learns when she leaves her black-and-white room is a proposition – see p. 442 of their article). It strikes me as more plausible to call these cases of knowledge by acquaintance, since they do not play the functional role of KH states.
clausal complements.

P3) Syntactically speaking, the only possible answers to such embedded questions are sentential/propositional answers (i.e. any other type of answer would violate syntactic rules).

C1) Subjects of KH ascriptions are being ascribed knowledge that takes the form of a sentence/proposition.

C2) KH is a species of KT

The first three premises are meant to follow directly from syntactic analysis alone. But the problem is with (P3), which is problematic since Stanley and Williamson have failed to make the case that “Wh” questions cannot have non-sentential answers. Without some sort of positive defense of (P3), it appears to be an unsupported assumption – an assumption upon which the argument hinges. And if it is indeed false, as I have argued above, then it must be rejected, which means that the conclusions are unsupported.

5.5 Stanley and Williamson’s Positive Account of KH

Perhaps, though, semantic analysis of knowledge ascriptions can salvage Stanley and Williamson’s conclusion. I will consider that analysis in the next section, but a point should be made before leaving the discussion of syntactic analysis behind.

Stanley and Williamson utilize both syntactic and semantic analysis in arriving at their account of KH. Overall, they are searching for an account of what someone knows when one has KH. Their syntactic analysis led them to the conclusion that what someone knows when one has KH must have propositional form. So now, in their semantic analysis, they are looking for the best propositional candidate for this position. But I have shown above that the syntactic argument that they make for that conclusion is weak, and thus the candidates for “object of KH” need not be limited to those that are propositional in nature. As such, Stanley and Williamson’s

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25 And since (P3) is a more general claim about K-Wh ascriptions, and KH ascriptions are not the only exceptions (see the qualia examples above), the evidence against (P3) is that much stronger.
semantic account requires independent support, since the missing piece of the puzzle need not be propositional after all.

5.5.1 Stanley and Williamson’s Semantic Analysis of Knowledge Ascriptions

So to the extent that Stanley and Williamson’s conclusion rests upon syntactic analysis, it is weak. But perhaps their conclusion will rest more heavily upon their semantic analysis of knowledge ascriptions than upon their syntactic analysis. In other words, perhaps their semantic analysis will convince us that the best candidate for “object of KH” is really a certain kind of proposition, even though the syntactic analysis does not entail such a conclusion. Again, this possibility puts a positive burden on Stanley and Williamson to name the proposition that Hannah knows when she knows how to ride a bicycle and to provide positive reasons in support, independent of the syntactic considerations. If such a proposition is forthcoming, the Intellectualist argument might look a bit stronger. If not, Intellectualists give us very little reason for accepting their conclusion. In the next section of their paper, Stanley and Williamson do provide an account of the proposition Hannah knows when she knows how to ride a bicycle. They do so in the course of discussing the semantics of knowledge ascriptions. However, I will argue that critical examination of their semantic account of KH does not help their case.

To preview Stanley and Williamson’s response to the problem raised above, they ultimately explain KH ascriptions as follows: the sentence “Hannah knows how to ride a bicycle” ascribes the following propositional knowledge to Hannah – Hannah knows \textit{that such-and-such is a way for her to ride a bicycle}. There are complications and elaborations added to this account, which I discuss below. I then move to a critical discussion of their account in the next section.
As noted above, Stanley and Williamson ultimately conclude that KH ascriptions have sentential/propositional complements and thus are similar to ascriptions such as “Hannah knows that penguins waddle.” In other words, all knowledge ascriptions (including KH ascriptions) “involve relations between propositions and persons”, though they note that it is “somewhat tricky to state exactly which propositions are at issue.”\textsuperscript{26} The trickiness they refer to here arises because of some technical issues that need not be discussed here. However, as I have noted in the previous section, that is not the only source of trickiness for their account. Stanley and Williamson must address the question: “what is the proposition that Hannah knows when Hannah knows how to ride a bicycle?”.

To answer this question, Stanley and Williamson invoke the notion of a way, and they argue that the knowledge we ascribe to Hannah when we say she knows how to ride a bicycle is knowledge that some way, $w$, is a way for her to ride a bicycle. Again, it might be helpful to consider this suggestion in light of the other K-Wh ascriptions from above:

\[(4a)\text{ Hannah knows where to find a nickel.}\]
\[(4b)\text{ Hannah knows whom to call for help in a fire.}\]
\[(4c)\text{ Hannah knows which prize to look for.}\]
\[(4d)\text{ Hannah knows why to vote for Gore.}\]

On the Stanley and Williamson model, these will ultimately get analyzed (roughly) as follows:

\[(4a')\text{ Hannah knows that } l \text{ is a location in which she can find a nickel.}\]
\[(4b')\text{ Hannah knows that } p \text{ is a person who she can call for help in a fire.}\]
\[(4c')\text{ Hannah knows that } q \text{ is the prize that she should look for.}\]
\[(4d')\text{ Hannah knows that } r \text{ is a reason as to why she should vote for Gore.}\]

And so (2), “Hannah knows how to ride a bicycle,” gets analyzed as:

\[(2')\text{ Hannah knows that } w \text{ is a way for her to ride a bicycle.}\]

What exactly is a way on Stanley and Williamson’s account?

\textsuperscript{26} Stanley and Williamson (2001), p. 422.
we shall take ways to be properties of token events. Ways are the elements of the domain of quantified expressions such as 'however', as in:

(25) However Douglas passes the ball, it results in a basket.

We believe that any successful account of natural language must postulate entities such as ways. But we shall not have much more of substance to say about the metaphysics of ways in this paper.27

I will have more to say about ways below. For now, though, it should be pointed out that the above account of KH, given in (2'), is admittedly insufficient since it seems possible for Hannah to know that some way, w, is a way to ride a bicycle and yet she could still lack knowledge how to ride the bicycle. Thus, in addition to knowing the proposition that w is a way to ride a bicycle, Hannah must entertain that proposition under a practical mode of presentation.

To explain the notion of a practical mode of presentation, Stanley and Williamson use the example of a first-person mode of presentation as a model. Here is their example:

Suppose that John is looking in a mirror, which he mistakenly believes to be a window. Seeing a man whose pants are on fire, and not recognizing that man as himself, John forms the demonstrative belief that that man is on fire. Intuitively, however, John does not believe that his own pants are on fire. That is, relative to the envisaged context, (26) is true and (27) is false:

(26) John believes that that man has burning pants.
(27) John believes that he himself has burning pants.

Given that 'that man' refers to John, however, the complement clauses of (26) and (27) express the same proposition, namely, the singular proposition containing John. To distinguish between (26) and (27), contemporary advocates of Russellian propositions appeal to different modes of presentation under which that proposition is entertained. In the envisaged context, (26) is associated with a demonstrative mode of presentation (or guise) of the relevant proposition, whereas (27) is associated with a first-personal mode of presentation of that very same proposition.28

The analogous case for KH is to say that sentence (28) above, and sentence (2) are also differentiated using the notion of different modes of presentation. In other words to ascribe

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Hannah KH as in sentence (2) and to ascribe to her KH as in sentence (28) is to ascribe to her knowledge of the same proposition, but under a different mode of presentation. When she knows how to ride a bicycle as in sentence (2), she has knowledge under a *practical mode of presentation*, whereas when she merely knows that that is a way to ride a bicycle (the way Bill is riding it), as in sentence (28), she knows the proposition under a *demonstrative mode of presentation*. The shift involves coming to recognize that the way that Bill is riding the bicycle is also a way for her to ride a bicycle.

Once Stanley and Williamson introduce the notion of a practical mode of presentation, the machinery is in place for them to provide their full, semantic account of KH ascriptions. They argue that “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.²⁹

It is important to note that Stanley and Williamson do not perceive themselves as making original contributions to the syntactic or semantic analysis of knowledge ascriptions. Rather, they see themselves as merely adopting widely accepted linguistic theories on such matters and using them to demonstrate that KH ascriptions are really KT ascriptions. Here is how they summarize this point:

Our view of ascriptions of knowledge-how is very straightforward. It is just that the standard linguistic account of the syntax and semantics of embedded questions is correct. Furthermore, it should not be radically altered to rescue philosophical views about an allegedly philosophically significant subclass of them. Sentences such as (2) have sentential complements. Furthermore, a sentence such as (2) is true relative to a context if and only if the subject stands in the knowledge-that relation to some (or every) member of the set of propositions denoted by the embedded 'how' question in that context.

We take our view of ascriptions of knowledge-how to be the default position. From a linguistic perspective, very little is special about ascriptions of knowledge-how. It is hard

²⁹ Ibid, p. 430.
to motivate singling them out for special treatment from the rest of a family of related constructions. Our view of ascriptions of knowledge-how is the analysis reached on full consideration of these constructions by theorists unencumbered by relevant philosophical prejudices.30

A few notes about these paragraphs before moving on to a critical analysis of their account of KH. First, Stanley and Williamson are being modest about their contribution, here, since they do introduce machinery (e.g. ways, and practical modes of presentation) that is not part of the standard equipment for analyzing knowledge ascriptions. So it is a bit misleading to simply say that their account is the “default position” and to say “very little” is special about KH ascriptions. On their account, there are a number of significant concepts that must be added to the standard linguistic analyses to make KH ascriptions fit into the KT model. That means that, second, there is a sense in which Stanley and Williamson are themselves “singling out” KH ascriptions for “special treatment”. None of the other members of the K-Wh family required the invention of a new mode of presentation, for example. Third, the non-Intellectualist, as noted above, can accept much of Stanley and Williamson’s linguistic analysis – and so the implication that views other than their own diverge from standard accounts of language is a bit overstated.

5.5.2 Critical Analysis of Stanley and Williamson’s Account of KH

Stanley and Williamson’s account of KH fails to identify a plausible propositional object of KH ascriptions. As noted above, it crucially depends upon two notions – the notion of a “way” and the notion of a “practical mode of presentation”, both of which raise problems.

To review, Stanley and Williamson’s complete analysis of the KH ascription, “Hannah knows how to ride a bicycle” is that such a sentence:

...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 Russelian proposition that $w$ is a way for Hannah to ride a bicycle, and Hannah entertains this proposition under a practical mode of presentation.\footnote{Stanley and Williamson (2001), p. 430.}

The notion of a way itself is not necessarily problematic. However, what is problematic is the idea that what Hannah knows when she knows how to ride a bicycle is \textit{that such-and-such is a way to ride a bicycle}. Absent the argument that linguistic analysis tells us that “how” questions must have propositional answers, there is little reason to accept this as a plausible explanation of what Hannah knows when she knows how to ride a bicycle.

As such, the claim that what Hannah knows is \textit{that such-and-such is a way} looks both ad hoc and unsatisfactory: Ad hoc because it appears to merely be a way of packing Hannah’s knowledge into ill-fitting propositional clothing; and unsatisfactory because the “such-and-such” in this explanation raises the same question that Stanley and Williamson were trying to answer – namely, what exactly is the proposition that Hannah knows when she knows how to ride a bicycle?

We can though, as noted above, make good use of Stanley and Williamson’s notion of a way. Consider the following possible analyses of what Hannah knows when she knows how to ride a bicycle:

(i) Hannah knows that such-and-such is a way to ride a bicycle.
(ii) Hannah knows a way to ride a bicycle.

I contend that (ii) is much closer to synonymous with a KH ascription than is (i). And though both (i) and (ii) are likely true if Hannah knows how to ride a bicycle, (i) seems true only as an inference from (ii). That is, in knowing how to ride a bicycle, Hannah knows a way to ride a bicycle, and she can thus infer (if she thinks about it), \textit{that} the way she rides is in fact a way to ride a bicycle. But to equate knowing how to ride a bicycle with (i) is implausible for reasons
discussed in Section 5.4.2 above: knowledge of propositions related to doing \( x \), no matter how central, or how many, is insufficient for ascribing KH. And once it is pointed out that propositional answers to embedded questions are not dictated by the standard linguistic theories of knowledge ascriptions, there is little independent reason for accepting this propositional account.

Much more needs to be said about this suggested alternative analysis of KH ascriptions, and I do not suggest it because I necessarily think that it is the proper account. But it has two obvious advantages. First, it is more intuitively plausible than the alternative that Stanley and Williamson provide because it comes closer to what ascriptions of KH actually ascribe in ordinary language. It is much more natural, I contend, to say that what I know when I know how to ride a bicycle is a way of riding a bicycle than it is to say that I know that such-and-such is a way to ride a bicycle. The second advantage is that (ii) could be adopted without doing much violence to the linguistic analyses that Stanley and Williamson provide. That is because on their account, KH ascriptions are part of the K-Wh family, which means they contain embedded questions. When we ascribe K-Wh (including KH), then, we are ascribing knowledge of answers to those questions, and those answers must take propositional form. On an account of KH ascriptions like the one suggested above (where KH ascriptions ascribe knowledge of ways), all that machinery can be retained, except for that last part. Instead of the answers to embedded questions being necessarily propositional, they can take other forms as well – for example, they could be knowledge of ways rather than just knowledge of propositions.

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32 On my positive account, knowing-how is best analyzed as a mental state, to be characterized functionally. For ways to be the object of KH mental states, I would need a conception of ways that was significantly different from Stanley and Williamson’s (which holds ways to be properties of token events).

33 Other related locutions might be phrases such as “know a method”, “know a process by which”, “know a manner in which”, etc.

34 It might be argued that ways are not the sorts of things that could be answers to questions, but that is exactly the point at issue. I have been arguing that entities other than propositions can be objects of knowledge, and as such,
This is an important point because, again, Stanley and Williamson claim as an advantage of their account of KH that it is the only account that is consistent with modern linguistic analyses of knowledge ascriptions. And they point out that a disadvantage of alternative accounts is that they fail to provide linguistic analyses of KH ascriptions. Demonstrating the possibility of alternative accounts of KH that are both consistent with their linguistic analyses (for the most part) and more plausible than the account they provide mitigates such claims.

In addition to invoking the notion of a way in their semantic analysis of KH ascriptions, Stanley and Williamson also invoke the notion of a practical mode of presentation. While the notion of a mode of presentation can be traced back to Frege, this particular kind of mode of presentation is original to Stanley and Williamson. Perhaps knowing that such-and-such is a way under a practical mode of presentation can improve the plausibility of their propositional account of KH. Unfortunately, it does not, for a number of reasons.

First, calling this mode of presentation “practical” is suggestive. It indicates a recognition on Stanley and Williamson’s part that knowledge of propositions as generally understood is not sufficient for capturing the fundamentally practical aim of KH—a point I have argued for repeatedly, above. Incorporating this notion into their account of KH, then, seems like a concession to the non-Intellectualist. It implies a recognition of a connection between KH and the ability to do something (since practical relates to action), even if there is not a direct entailment, as they argued in criticizing Ryle.

And this is not the only reason for being skeptical about practical modes of presentation. Remember that Stanley and Williamson introduce this notion using the analogy of first-person

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they can be answers to questions of the form “what do you know when you know x?” Furthermore, I claim that Stanley and Williamson's linguistic analyses have failed to undermine this claim.

35 After all, Stanley and Williamson are, in effect, inventing (perhaps they would say discovering) an entirely new mode of presentation to explain KH ascriptions.
modes of presentation. They additionally argue that the existence of practical modes of presentation can be derived using the same sort of argument that proves the existence of first-person modes of presentation. That is, if one accepts the existence of first-person modes of presentation, one must also accept the existence of practical modes of presentation – since the arguments for both have the same logical form.

However, as Alva Noë has pointed out, this analogy does not hold. Remember the argument for first-person modes of presentation: they explain how two propositions that say the same thing could nevertheless have different significance. Here is the example (quoted above) that Stanley and Williamson use to motivate the existence of first-person modes of presentation:

(26) John believes that that man has burning pants.
(27) John believes that he himself has burning pants.

Since “that man” in (26) and “he himself” in (27) refer to the same person, the two sentences express the same proposition (on a Russellian interpretation of propositions). And yet John might accept one without accepting the other. How to explain that? Well, using the notion of different modes of presentation, it can be explained that John accepts (26) and rejects (27) because he is considering the proposition under a demonstrative mode of presentation, but not a first person mode of presentation. Once he realizes that he is looking at himself – that he himself is “that man” – he now comes to entertain the sentence in (26) under a first person mode of presentation, which leads him to accept (27). In short, then, first-person modes of presentation are invoked in order to explain how two sentences that express the same proposition could nevertheless have different “cognitive significance”.

According to Stanley and Williamson, the same kind of argument can be used to argue for the existence of practical modes of presentation. That means that Stanley and Williamson are

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trying to explain how two sentences that express the same proposition could nevertheless seem different (or something to that effect). Here is their introduction of the notion of a practical mode of presentation:

Suppose that Hannah does not know how to ride a bicycle. Susan points to John who is riding a bicycle, and says, ‘That is a way for you to ride a bicycle’. Suppose that the way in which John is riding his bicycle is in fact a way for Hannah to ride a bicycle. So where the demonstrative ‘that way’ denotes John’s way of riding a bicycle, (28) seems true:

\[(28) \text{ Hannah knows that that way is a way for her to ride a bicycle.} \]

Relative to this context, however:

\[(29) \text{ Hannah knows how to ride a bicycle.}^{37} \]

seems false. This case parallels (26) and (27)...(28) and (29) ascribe knowledge of the same proposition to Hannah. But this proposition is ascribed under different guises. In (28), knowledge of the proposition is ascribed to Hannah under a demonstrative mode of presentation. In (29), knowledge of that proposition is ascribed to Hannah under a different mode of presentation, what we call a practical mode of presentation (italics in the original).^{38}

Remember, modes of presentation were invoked to explain how the same proposition could nevertheless have different cognitive significance to some agent. The cognitive significance of the belief that some guy’s pants are on fire shifts for John once he realizes that he is that guy. The mystery arose in the first place because while it is obvious, from our perspective, that the two beliefs have the same content – John, for some reason, took different attitudes towards them. Why? Because he did not see them as equivalent. He was entertaining them in different ways. That is why the first person mode of presentation is invoked.

Stanley and Williamson claim that the Hannah bicycle riding case is parallel. But how, exactly is that parallel story supposed to go? Well, following the structure of the above

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37 Actually, their (29) is slightly different: “Hannah knows [how PRO, to ride a bicycle].” It has been altered to make it understandable in light of the fact that I have omitted some of the technical discussion in their paper. The change does not affect the argument.
paragraph we would say: the cognitive significance of the knowledge that John’s way is a way of riding a bicycle shifts for Hannah when she realizes that John’s way is a way for her to ride a bicycle. The mystery arose in the first place because while it is obvious, from our perspective, that the two bits of knowledge have the same content – Hannah, for some reason, took different attitudes towards them. Why? Because she did not see them as equivalent. She was entertaining them in different ways. That is why the practical mode of presentation is invoked.

The problem with this parallel story is that it is not at all obvious, from our perspective, that the two bits of knowledge have the same content. As Noë points out, “the analogy breaks down”:

We have no independent reason to believe that the complement clauses in (28) and (29) express the same proposition. Indeed, Stanley and Williamson are forced to appeal to modes of presentation just in order make plausible the idea that they do. It is plainly circular for them to claim that considerations about the identity of the embedded propositions in (28) and (29) give one reason to believe in the existence of the relevant type of mode of presentation.

In other words, Stanley and Williamson base their argument for the existence of practical modes of presentation on the “obvious” equivalence of two sentences, and then go on to argue for that same equivalence by invoking practical modes of presentation. That is the circle Noë is referring to.

Perhaps there are independent reasons, though, for accepting the equivalence of sentences such as:

Hannah knows that John’s way of riding a bicycle is a way for her to ride a bicycle.

Hannah knows how to ride a bicycle.

even if Stanley and Williamson do not provide them. If so, I find it difficult to discern what they might be. Perhaps if they had succeeded in demonstrating that the object of a knowledge

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ascription must be propositional, we would have stronger reason to believe in practical modes of presentation.\textsuperscript{40} But as I have argued above, that is not the case. Furthermore, I would argue, the claim that sentences such as these are equivalent is extremely counterintuitive. The idea that one could come to possess knowledge of how to ride a bicycle by (a) watching someone else riding a bicycle; (b) realizing that that person’s way of riding a bicycle is a way of riding a bicycle; and then (c) entertaining that knowledge from a new and different perspective is completely contrary to the folk theory of KH that I presented in Chapter 2. If KH was so cheap to come by, it would be incredibly difficult to explain all the distinctions we tend to draw between KH and KT, pre-theoretically.\textsuperscript{41}

5.6 Further Problems for Stanley and Williamson’s Account of KH

There is an additional problem with the claim that Stanley and Williamson are merely following the linguists. Namely, there are those who disagree with the analysis that they present. Some have argued, for example, that while Stanley and Williamson’s analysis captures the truth about knowledge ascriptions in English, it fails to provide a universal account of such ascriptions, since different languages require different analyses.

5.6.1 Knowledge Ascriptions and Other Languages

Some languages use completely different words for knowledge ascriptions of different types. And presumably the two kinds of knowledge do not differ from country to country, and from culture to culture. Knowing how to ride a bicycle is the same in Germany, Japan and Argentina as it is in English-speaking countries. The fact that Stanley and Williamson’s account of KH

\textsuperscript{40} I.e. given that the solution must be a proposition, their candidate might be the best candidate.

\textsuperscript{41} Perhaps step (c) – entertaining a proposition under a practical mode of presentation – is meant to involve doing things such as getting on an actual bicycle, learning how to balance, steer, position one’s body, etc. I do not find any evidence that that is what Stanley and Williamson intended, and if it were the case, then practical modes of presentation would not be at all parallel to the first person modes of presentation, given that the latter involve a mere shift in perspective.
of KH depends upon English-contingent linguistic analyses, then, undermines their methodology of using KH-ascriptions to answer questions about the nature of KH itself (and its relation to KT). Put another way, it is possible that a philosopher, writing in a language in which analyses of KH and KT ascriptions turn out to be structurally different, could infer that KH and KT are thus distinct – the opposite conclusion than that drawn by Stanley and Williamson. To resolve such a dispute (about the nature of KH and KT), extra-linguistic resources would need to be part of the argument.

To some extent, Stanley and Williamson anticipate such an objection. They recognize that some languages have completely different words for different senses of “know”, but they argue that these different words do not track the KH/KT distinction, and thus do not suggest a fundamental ambiguity with the term “know”. However, some have challenged their claim. Ian Rumfitt, for example, notes that KH ascriptions in French do not usually take the form they do in English – with an embedded question in a clausal complement. He notes:

When a French speaker ascribes the sort of knowledge-how in which Ryle was interested, however, he does not use an interrogative construction at all, but instead employs a bare infinitive:

(5) Elle sait monter à vélo.
    She knows how to ride a bicycle.

(6) Il sait nager.
    He knows how to swim.

(7) Il sait parler français.
    He knows how to speak French.

Since the interrogative word comment is not to be found in them, these French attributions afford no support to Stanley and Williamson's hypothesis that the

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42 Stanley and Williamson focus on German, but also mention French (see pp. 436-7). They do not mention the point about the different syntactic structures of knowledge ascriptions in French, though, which is Rumfitt’s focus in his discussion of French.
knowledge being attributed when we say that someone knows how to ride a bicycle is knowledge of a proposition which could answer a 'How to?' question.\textsuperscript{43}

Rumfitt notes that Greek and Latin provide similar examples, and that Russian provides a counterexample to Stanley and Williamson’s claim that different words for “know” do not tend to track the KH/KT distinction:

The verb used to attribute propositional knowledge in Russian is…3HаTb (znat’), and this verb is also used to ascribe knowledge of the answers to questions…In attributing knowledge-how, though, one uses the unrelated verb…УМЕТb (umet’), which has a quite different grammatical distribution. It can be complemented neither by… (a 'that'-clause), nor by an indirect question, but must govern an infinitive.\textsuperscript{44}

In other words, if Carr had made his argument in Russian, it might have been much more convincing.

Others have challenged Stanley and Williamson’s semantic analysis – especially the claim that embedded questions denote a proposition (or a set of propositions) that provides a true answer to the embedded question. This is a crucial claim for Stanley and Williamson since it leads directly to their conclusion that KH is a species of KT. However, there is a great deal of debate on this very topic. Linguist Craige Roberts argues for what she calls a “compositional” (as opposed to propositional) approach to KH ascriptions. She argues that the evidence goes against Stanley and Williamson’s interpretation of such ascriptions, and concludes that, “the linguistic evidence converges on the conclusion that how-to infinitivals are of a different semantic type than that-complements.”\textsuperscript{45} And in an essay in an anthology on KH from Oxford University Press, John Bengson and Marc Moffett argue that, “Stanley and Williamson (2001, 440) are simply wrong when they claim that their treatment of the syntax and semantics of attributions of knowledge how ‘is the account entailed by current theories about the syntax and

\textsuperscript{44} Ibid, p. 164. Hille Paakkunainen informs me that her native language, Finnish, is similar to Russian in this respect.
\textsuperscript{45} Roberts (2009), p. 28. The above quote is from a 2007 preprint.
semantics of the relevant constructions’ (emphasis added).” 46 So even if we grant Stanley and Williamson’s underlying premise, that linguistic analysis of knowledge ascriptions is the way to approach the KH/KT debate, there are nevertheless reasons to doubt their ultimate conclusion, that KH is a species of KT.

The underlying disagreement about the relevant linguistic analysis is some evidence that we should look elsewhere for assistance in resolving the various disputes surrounding this debate. This is a mark in favor of the general methodological approach that I have been advocating and practicing throughout this dissertation involving the consideration of empirical data.

5.6.2 The Deeper Problem with Linguistic Methodology

Towards the end of their paper, in discussing possible objections to their account of KH, Stanley and Williamson raise the issue of knowledge in animals. They are considering the possible objection that we often ascribe KH to animals (e.g. “my dog Pip knows how to catch a Frisbee”) who may not be “sufficiently conceptually sophisticated enough to possess propositional knowledge.” 47 Such animals (and any beings that could be said to have KH but lack KT 48) would be counterexamples to Stanley and Williamson’s account, according to which having KH entails having KT. In response to this possibility, Stanley and Williamson also note that we often ascribe KT to animals as well (e.g. “my dog Pip knows that I come home at 4 p.m. every day”). They conclude:

So, smooth ascriptions of knowledge-how to nonhuman animals are simply no objection to our account. Everyone requires some account of uses of sentences such as (47a-b) [sentences ascribing KT to a dog]. Whatever account is provided will work equally well

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48 E.g. Henry M., discussed in Chapter 3.
for uses of sentences such as (46) [a sentence ascribing KH to a dog].

But here is a potential account that treats the two kinds of sentences differently: when we use sentences that ascribe KH to animals, we mean them literally (at least in some cases), but when we use sentences that ascribe KT to animals, we do not mean them literally. How to explain the difference? In the account of KH that I provide in the next chapter, KH Functionalism, I consider knowledge states as mental states and characterize them in terms of the functional role that they play. On such an account, it might well turn out that (at least some) ascriptions of KH to a dog come out true, since there is something within the dog playing the KH functional role, while ascriptions of KT to the dog come out false, since there is nothing within the dog playing the KT functional role (due to a lack of conceptual sophistication, perhaps).

Put aside, for now, the question of whether this account is right or wrong. Consider instead the question: can this account be shown to be wrong merely by reference to linguistic analysis of knowledge ascriptions? More generally, could a metaphysical claim about the nature of a certain entity (a KH mental state) be disproven by the reference to the way people happen to talk? Human languages, and the conventions that govern them, are diverse (as noted above), sometimes inconsistent, and change over time – often due to newly acquired knowledge, or fundamental shifts in beliefs or values. As a result, we need not assume that language always succeeds at cutting nature at its joints. It is possible for the grammar of sentences to be systematically misleading.

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

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have to do with what we are talking about or thinking about or studying when we study practical knowledge?\(^{50}\)

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.\(^{51}\)

Noë points out that “whether or not [dogs] can grasp propositions is an open question, one that is debated in cognitive science”.\(^{52}\) It is not something that can be settled by analysis of knowledge ascriptions.

5.7 Conclusion

In this chapter, I have challenged Stanley and Williamson’s claim that KH is a species of KT. One central objection to their account is my claim that a fundamental premise in their linguistic argument asserts, with very little evidence, that true answers to “wh” questions (including “how” questions, such as “how do I ride a bicycle?”) must have sentential/propositional form. There is both a lack of positive evidence for this claim, and also good reason for thinking that it is false. Once that claim is undermined, Stanley and Williamson’s positive semantic account of KH looks much less plausible. Additionally, there are independent reasons for doubting both their syntactic and semantic analysis of KH ascriptions that stem from consideration of knowledge ascriptions in other languages, and from a closer look at some of their central concepts, such as “practical modes of presentation.” On top of that, there are empirical reasons for challenging their analysis, such as the neurological evidence that arises from conditions such as Henry M.’s, discussed in Chapter 3. And finally,

\(^{50}\) Noë (2005), p. 286.

\(^{51}\) Ibid, p. 290.

\(^{52}\) Ibid, p. 289.
there are good reasons for being skeptical about the overall approach Stanley and Williamson take whereby they attempt to illuminate the nature of knowledge states by way of examining the syntactic and semantic properties of knowledge ascriptions. So the case that they make for the claim that KH is a species of KT fails on a number of different levels.
Chapter 6: A Functionalist Account of Knowing-How

6.1 Introduction

Throughout this dissertation, I have been critical of the philosophical treatment of the knowing-that/knowing-how debate. I have argued that too much emphasis has been placed on the methods of investigation used by Ryle when he began the modern discussion of the subject – especially the methods of conceptual and linguistic analysis. Additionally, Ryle grounded the debate about knowing-how (hereafter, KH) and knowing-that (hereafter, KT) within the debate about intellectualism, where it has remained ever since. That is, philosophers start the discussion of KH and KT by asking whether or not all intelligent behavior is, in some sense, propositional. Given the absence of a general philosophical theory of intelligent behavior, this too seems a poor starting point for investigating these questions.

As an alternative, I have begun with a folk theory of KH that utilizes, but does not rely solely upon, conceptual and linguistic data. I further argue that empirical results in relevant disciplines can be used to inform, evaluate, and perhaps sharpen (or replace), the picture of KH given by this folk theory.

In this chapter, I present a positive account of KH that goes naturally with, and builds upon, the results presented in previous chapters, and which avoids the problems that arise with the alternative approaches. I will argue that since KH and KT are, broadly speaking, mental states, the debate about KH and KT should be grounded in a general theory of mind, rather than specifically in a philosophical theory of intelligent behavior.\(^1\) One advantage of this approach is that there do exist philosophical theories of mind – and a somewhat broad consensus about the most promising such theory: Functionalism.

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\(^1\) Grounding accounts of knowledge in a general theory of mind will, I would argue, contribute to the development of a philosophical theory of intelligence.
Functionalists characterize mental states in terms of the functional role that they play in the mind – as opposed to, for example, characterizing them in terms of their material constitution. There are different versions of the theory, and there are still significant disagreements about important details of the theory, as well as persistent objections (e.g. related to qualia). Nevertheless, there is a broadly acceptable framework in place within which to work, and the debate about KH and KT (and their relation) fits naturally within that framework.

In what follows, I give a Functionalist account of KH in very general terms, which I will call KH Functionalism. The main goal of this chapter is to give a broad sense of what such an account might look like and to demonstrate its advantages. Additionally, I will argue that situating the KH/KT debate within the framework of Functionalism provides further support for what I have been calling the Distinction Hypothesis – i.e. the claim that KH and KT are distinct kinds of knowledge. Finally, I will consider and respond to potential problems and objections to this approach.

I will not, in this work, put forward a general defense of Functionalism, or provide an exhaustive discussion of the different versions of the theory, or rehearse all of the various outstanding problems that the theory faces. I will do as much with respect to those issues, as I need to do for the project at hand and explain, as I go, why I am ignoring certain issues when I do so.

I take Functionalism to be the default theory of mind among contemporary philosophers of mind and cognitive scientists, which is not the same as taking it to be universally accepted. I will say a bit throughout the chapter about how my account might be adjusted or revised to address theories of mind that are alternatives to Functionalism.
6.2 Functionalism: The Basic Idea

While there are a number of different versions of Functionalism as a theory of mind (and I discuss some of the distinctions and differences in some detail below), the key aspect of any version of Functionalism is the claim that mental states are to be characterized in functional terms. Here’s the Stanford Encyclopedia of Philosophy’s opening sentence on the subject of Functionalism:

Functionalism in the philosophy of mind is the doctrine that what makes something a mental state of a particular type does not depend on its internal constitution, but rather on the way it functions, or the role it plays, in the system of which it is a part.¹

The textbook example of a mental state used to illustrate the central idea of Functionalism is pain. To be in pain is to be in a certain mental state. That mental state should not be defined in terms of its underlying material constitution in the brain, for that would imply that beings with different material constitutions would be unable to feel pain, which seems implausible, and chauvinistic. So what makes it the case that beings with different material constitutions can feel pain? It is the fact that something within them is playing a certain functional role. What functional role, exactly?

For (an avowedly simplistic) example, a functionalist theory might characterize pain as a state that tends to be caused by bodily injury, to produce the belief that something is wrong with the body and the desire to be out of that state, to produce anxiety, and, in the absence of any stronger, conflicting desires, to cause wincing or moaning. According to this theory, all and only creatures with internal states that meet these conditions, or play these roles, are capable of being in pain.²

More generally speaking, the functional account of a particular mental state is given in terms of the sorts of inputs that tend to give rise to that state (e.g. bodily injury), the connections that that state has to other mental states (e.g. the belief that something is wrong, the desire to be out of that state, anxiety, etc.), and the outputs, or effects, typically brought about by that state (e.g.

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¹ Levin (2009).
² Levin (2009)
wincing, moaning). Because Functionalism characterizes mental states in terms of their functional role, it allows for the possibility that beings that are differently constituted from human beings could have (or be in) such states.

### 6.2.1 Knowledge as a Mental State

The functional story for knowledge states is going to be similar, with respect to this basic idea. Substitute “KH” and/or “KT” for “pain” in the remarks above and we get something like the following argument: to possess KH/KT (i.e. to know how to $x$, or to know that $y$ is the case) is to be in, or possess, a certain type of mental state. That mental state should not be characterized in terms of its underlying material constitution in the brain, for that would imply that beings with different material constitutions are unable to possess KH/KT, which seems implausible, and chauvinistic. Such states should, then, be defined functionally, in terms of the inputs that typically give rise to them; the connections they have to other mental states, and the outputs, or effects, typically generated by such states.

I take nothing I have said so far to be particularly controversial or objectionable. After all, the most prominent account of KT takes such knowledge to be a kind of belief;¹ and beliefs are standardly taken as a kind of mental state (i.e. a propositional attitude). So, in a sense, much work has already been done to elucidate the functional role of propositional knowledge, since much work has already been done to elucidate the functional role of propositional attitudes in general, and beliefs in particular.⁵ And those philosophers who are Functionalists about mental states, and who believe that KH reduces to, or is a kind of, KT, should have no problem with the notion that KH should be characterized functionally as well – since such philosophers would say

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¹ I am referring to the JTB (justified true belief) account of propositional knowledge, which holds that knowledge is a kind of belief – specifically, a belief that is both justified and true (and meets whatever additional criteria necessary to avoid Gettier problems).

⁵ See, for example, Jerry Fodor (1975) and Gilbert Harman (1973) for some early examples.
that KH is also a kind of belief.⁶

There might be a concern that while beliefs are perfectly good candidates for functional treatment, knowledge is not. After all, knowledge, on the standard account, is not merely a belief, but a belief that is justified and true (and perhaps has some other properties as well). Perhaps these further characteristics are not amenable to functional treatment. My response is twofold: first, even if justification and truth are not themselves amenable to a full-blown functional treatment, it is still possible to incorporate these properties of a belief state into a functional account of KT, to a certain extent — sufficient for the purposes of the present project. I do this below when I flesh out the functional role of KT. Second, very little hangs on this issue, since my focus is on the representational nature of KT, which it inherits from being a kind of belief, or propositional attitude.

6.2.2 Pain and Knowledge

While the basic Functionalist story is similar for pain states and knowledge states, there are a few important differences. For one thing, the mental state of pain (or being in pain) is primarily experiential/phenomenological. That is, being in pain seems to essentially involve the subjective feel associated with that state. It would make little sense to say “I am currently in pain, but I do not feel any pain”. The feeling is an intrinsic aspect of the mental state. Knowledge, on the other hand, is not like that. “What does it feel like to know that the capital of New York is Albany?” does not, generally speaking, have an answer in the way that “what does it feel like to be in pain?” does. When it comes to knowledge – at least of the KT variety – the

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⁶ In fact, it is reasonable to view various accounts of KH, such as Stanley and Williamson’s, as explaining the content of KH mental states, despite the fact that they do not specifically write in a Functionalist context. I say more about this below. It should be noted that Williamson, in Williamson (2000), rejects the view that knowledge is a kind of belief. But he still views KT as a propositional attitude, the central nature of which is representational.
central content is propositional, not phenomenological – hence the term *propositional attitude*.\(^7\)

Additionally, pain is a mental state that only exists when one is in it. It is occurrent. Knowledge, on the other hand, can be possessed but not necessarily be present to the conscious mind. I can know that Albany is the capital of New York even if I am not currently entertaining that particular thought. And, I can know how to ride a bicycle, even if I am not currently riding a bicycle. Furthermore, I can know these things long after I originally acquired the knowledge (whereas the pain state goes out of existence when the pain stops). That means that unlike the functional characterization of pain, the functional characterization of a knowledge state is not necessarily going to involve a story about how the state was originally caused or acquired, but rather it will involve a story about what being in, or possessing, such a state *now* involves. This issue will get explored in a bit more detail below due to the fact that according to my account of KH, to possess KH now, one must have acquired that KH at some point through a process of learning, which will generally involve direct experience with the activity in question, training, practice, etc.

One last point: the functional characterization of pain states is going to be straightforwardly *causal*. Inputs, like bodily traumas, are going to be things that cause pain; outputs, like wincing, are going to be behaviors that pains cause; and connections to other states – such as anxiety, the desire to not be in pain anymore, etc. – are going to be caused directly by the pain state. With respect to functionally characterizing beliefs (and propositional attitudes in general), spelling out inputs, outputs and connections is generally going to be a bit more complicated, since it will involve invoking *inferences*. For example, having the belief that Albany is the capital of New York will likely connect, inferentially, to the belief that the New

\(^7\) On my account, KH is not a propositional attitude since it is not essentially representational. But it is not primarily phenomenological, either. It is, as noted above, practical. This might allay qualia concerns that arise for Functionalist accounts of phenomenological mental states.
York state legislature meets in Albany. While the former belief state can clearly be a reason for the latter, it is not clear that it is a cause of it. There is a long-running, ongoing debate about whether inferences (or reasons) should be construed causally. While I sometimes use causal language in characterizing knowledge states below, that is not meant to imply a specific position with respect to this thorny question. The issue need not be settled here, and nothing in what I say below depends on the outcome of that debate, so far as I can tell. The central aspect of KT states that I will focus on below is the fact that they are representational in nature, which I take to be something that both sides of the abovementioned debate would agree about.

Despite the above complications, the basic Functionalist idea is the same with respect to both pain states and knowledge states. Such states can be characterized in terms of the functional role that they play in the mind, and those functional roles will be spelled out in terms of inputs that give rise to such states, the outputs such states lead to, and the connections such states have to other mental states. But there is still a general question about how exactly we proceed in spelling out the functional roles for specific mental states – whether pain states or knowledge states. I say a bit about that in the next section before proceeding to a discussion of KH and KT mental states specifically.

6.2.3 How to Characterize the Functional Role of a Mental State

The question we are here concerned with is about how to characterize the functional role that a mental state plays within an individual who is in, or possesses, that state. With respect to knowledge states, we want to know: What is it, exactly, for Joe (or for some individual) to possess KT – e.g. to know that Albany is the capital of New York? And what is it, exactly, for Hannah to possess KH – e.g. to know how to ride a bicycle? And how should we go about answering these questions?
To illustrate the process, consider again the textbook example of *pain*, discussed above. How did it get established that pain is characterized as whatever plays the functional role described above (with bodily harm as input, pain behavior as output, and connections to other mental states such as anxiety, fear, etc.)? In general terms, we begin to develop such a characterization by considering our own experiences and the experiences of others, investigating the way we talk about and ascribe pain, and also by thinking about when we would refrain from ascribing pain. This type of enquiry, which includes (but is not limited to) conceptual analysis, can involve consideration of paradigm examples of the relevant concept, as well as by thinking about borderline cases, and atypical contexts – such as artificial life forms, aliens, or actual life forms that are radically different from human beings. “If the little green Martians come for a visit someday,” it might be asked, “how are we going to determine whether or not they feel pain?” Or, “when, if ever, would it be true to say of the robots we create that they feel pain?”.

Empirical investigations can also contribute to this type of project. For example, brain scans of people, or animals, as they experience pain can illuminate the underlying neural mechanisms associated with pain states, for example, and perhaps lead us to revise our pre-theoretical views.8

That same sort of process should be used to characterize particular knowledge states as well as pain states (while keeping the relevant differences, discussed above, in mind). With respect to questions like “what is it, exactly, for Joe (or somebody) to know that Albany is the capital of New York?; or for Hannah (or somebody) to know how to ride a bicycle?”, we can begin to formulate answers by considering our own experiences and the experiences of others, investigating the way we talk about and ascribe knowledge in such cases, and also by thinking about when we would refrain from ascribing knowledge. We can, similarly, motivate such

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8 There is debate about whether empirical data should play a role in functionally characterizing mental states. I discuss this debate in some detail in section 6.9 below.
investigations using both paradigm cases, and atypical contexts – such as robots, aliens and actual life forms that are radically different from humans; and we can take into consideration the results of various empirical investigations.\(^9\)

I take this to be the standard method used to generate characterizations of the functional roles played by various mental states – or at least, the method used to generate a preliminary characterization.\(^10\) Without further ado let us apply this method specifically to KH and KT states.

### 6.3 The Functional Roles of KT states

So, how exactly does the functional role of a knowledge state get characterized? How does that input/connection/output story go with KT and KH states? Let’s begin with a KT state, such as knowing that Albany is the capital of New York. If we think about what originally led one to have the belief that Albany is the capital of New York, the story might go as follows: the inputs that give rise to such a belief would tend to be inferences that originate from perceptual states, perhaps, or from testimony – e.g. Joe knows that Albany is the capital of New York because he saw a star next to Albany on a map, and he believes that stars designate capital cities, and he takes the map to be reliable. Once acquired, Joe’s belief would have connections to other beliefs – about, for example, the meanings of relevant terms, or to certain related beliefs (e.g. the belief that the New York state legislature meets in Albany). And the outputs of such a belief would include certain behaviors, such as giving true answers to certain questions such as, “what is the capital of New York?”.

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\(^9\) I have done some of this work in Chapter 2, where I develop a folk theory of KH, and in Chapters 3 and 4, where I consider empirical investigations related to KH and KT.

\(^{10}\) The version of Functionalism I am assuming, as noted above, allows for the possibility that empirical investigation can lead to revisions in this initial characterization. See my discussion below of a priori vs. a posteriori functionalism for more details.
knowledge is *representational*. One has KT when one has an accurate representation of a certain part of the world.

Two issues arise with respect to this story, however. One relates to the acquisition/possession distinction and the other to the belief/knowledge distinction. First, as noted above, acquiring a belief originally and possessing a belief now are not the same thing. It might be true that Joe acquired a belief that Albany is the capital of New York by looking at a map and making certain inferences, but he may now have no memory of that original acquisition, though he still holds the belief. So what inputs would now be evidence Joe holds such a belief?

Well, asking Joe about the belief (or related beliefs), either directly or indirectly, would be a way to determine his beliefs on the subject now. So perhaps one way of functionally characterizing Joe’s present *possession* of such a belief state would be: inputs – questions about the capital of New York; outputs – Joe’s answers to those questions; connections – e.g. beliefs about meanings of relevant terms, etc.

However, and on to the point about the belief/knowledge distinction, when Joe possesses KT he does not merely believe that Albany is the capital of New York, but additionally his belief is justified and true. So, merely asking Joe about his belief would be insufficient to determine if he is justified in believing it. We would have to know something about the process by which he acquired his belief, or the reasons he has for holding the belief (which might well involve an inferential story such as the one noted above in the description of how a belief is acquired). So the input story for a KT state will involve an account of how the belief came to be justified. And the output story will involve providing correct answers to relevant questions. So the functional characterization of a KT state will look something like this:
<table>
<thead>
<tr>
<th>Inputs</th>
<th>Inferences, information derived from various reliable sources, including perception and testimony.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connections to other mental states</td>
<td>Inferential connections to other beliefs (related, for example to the meanings of relevant terms), and other mental states</td>
</tr>
<tr>
<td>Outputs</td>
<td>Accurately answering questions, making inferences, etc. (as a result of possessing an accurate representation)</td>
</tr>
</tbody>
</table>

### 6.4 The Functional Role of KH States

With respect to a KH state, such as knowing how to ride a bicycle, the account is going to be significantly different. Again, if we think about how one originally comes to know how to ride a bicycle, the story might go as follows: the inputs that give rise to some bit of KH might include (as in the case of KT) inferences that originate from perceptual states, or from testimony – e.g. Hannah might know that she has to put her feet on the pedals in order to ride a bicycle (because someone told her so), and that these things she sees on the bike are, in fact, the pedals. But such inputs would not be sufficient for KH, since Hannah must have some experience – i.e. practice and rehearsal – on an actual bicycle in order to acquire and then possess KH.

With respect to the connections between a KH state and other states, again (as in KT) there would be links to beliefs (e.g. if Hannah knows how to ride a bicycle, she’ll also tend to believe that she can ride a bicycle, and believe that her way of riding a bicycle is a way to ride a bicycle, etc.). Additionally, there will be connections to other KH states (e.g. knowing how to balance, knowing how to pedal and steer at the same time, etc.); and, unlike in the case of typical
KT, there will be connections to proprioceptive states, such as the feeling of how one’s body must be positioned in order to balance on a bicycle, and in order to pedal without falling over, etc.). These proprioceptive states will involve not just neurons in Hannah’s brain, but also muscles in her body.

As for outputs, Hannah will no doubt tend to answer questions about her bicycle riding accurately, as Joe does with respect to the capital of New York. But, primarily, the output of a KH state will be an activity (or the exercise of an ability) – e.g. Hannah riding a bicycle.

Above, with respect to examples of KT, I summarized the functional role using the term representational. But that term will not work with respect to examples of KH, such as Hannah’s knowing how to ride bicycle. While Hannah’s KH might include representations (e.g. she might have a mental picture of a bicycle, have true beliefs about bicycles, etc.), the state itself is not functionally representational. It is, for lack of a better term, practical. Possessing KH does not, primarily, involve having an accurate picture of the world.\textsuperscript{11} Rather, it allows one to exercise an ability. It allows one to do.

As with the functional account of KT given above, the issue of acquisition versus possession seems to arise here with KH as well. The story above is about how Hannah acquires the knowledge of how to ride a bicycle; but what about an account of what it means to presently possess KH, long after one has acquired it? With respect to this issue, a substantial distinction arises between KH and KT. In the case of KT, acquisition of the belief can be completely irrelevant (though recall that in order for a belief to be justified, some account must be given about, for example, the inferential support for that belief). But for KH, acquisition is relevant. In order to now possess knowledge of how to do something, one must have, at some point,

\textsuperscript{11} It is, in fact, not uncommon for people to have knowledge of how to do things without being able to answer questions about how they do it – and not only in pathological cases such as amnesic Henry M., discussed in Chapter 3, but also in non-pathological cases such as the famous Japanese chicken sexers, briefly discussed in Chapter 5.
learned how to do that thing. Typically, that learning is going to involve actual experience with the relevant activity, and in many cases that experience will involve practice and rehearsal. If someone (or some being) possesses an ability in the absence of such learning, we do not generally refer to them as knowing how to do that thing. We do not, for example, categorize instinctual behaviors and automatic, reflexive reactions as knowledge – and for good reason, since they involve the expense of no cognitive effort.

Additionally, in the functionalist account of KT above, there was an issue with respect to having a belief versus having knowledge. Again, there is a significant difference here in the case of KH since knowing how to do something is not, essentially, a matter of having a belief(s). That, too, is reflected in our linguistic practices. “I believe that Albany is the capital of New York” is a perfectly acceptable thing to say, while “I believe how to ride a bicycle” is not. This also helps to explain why KH states are not functionally representational, since they are not a kind of belief or, more generally a kind of propositional attitude.

So, the differences with respect to the roles played by the two kinds of knowledge state are readily apparent and significant. It seems clear that the functional characterizations of these kinds of mental states are quite different, and that the functional role associated with KH is not a kind or type of the functional role associated with KT. Here is a summary:

<table>
<thead>
<tr>
<th></th>
<th>Propositional Knowledge (KT)</th>
<th>Knowing-How (KH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td>Inferences, information derived from various reliable sources, including perception and testimony.</td>
<td>Learning: experience, practice, rehearsal</td>
</tr>
<tr>
<td>Connections to other mental states</td>
<td>Inferential connections to other beliefs (related, for example to the meanings of relevant terms), and</td>
<td>Connections to other KH, proprioceptive connections, and (generally)</td>
</tr>
</tbody>
</table>

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Other mental states

<table>
<thead>
<tr>
<th>Connections to relevant beliefs, desires, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
</tr>
<tr>
<td>Accurately answering questions, making inferences, etc. (as a result of possessing an accurate representation)</td>
</tr>
<tr>
<td>Doing x (e.g. riding a bicycle) – in the absence of defeaters</td>
</tr>
</tbody>
</table>

However, one might object to the above characterizations on the grounds that they are inaccurate in significant ways. They are, after all, based only on preliminary considerations, which (as I have argued elsewhere in this dissertation) is a good, though defeasible, starting point. Perhaps the characteristics ascribed to KH and KT above, as well as the differences between the two kinds of knowledge, will turn out to be illusory, or based on mistaken assumptions, etc. This does not, however, seem likely to be the case. In earlier chapters of this dissertation I developed a folk theory of KH that incorporated the results of conceptual analysis, such as those discussed above. Furthermore, I tested that folk theory against a number of empirical sources. In Chapter 2, for example, I surveyed the neurological literature on the two kinds of knowledge, and in Chapter 3, I considered the psychological literature on intelligence. In both cases, I found significant support for the folk theory. Some divergences from the folk theory are suggested by the empirical data – about, for example, the univocal nature of KH. But in general, the empirical work that has been done with respect to this issue seems to demonstrate significant support for the folk psychological theory described in Chapter 2, especially those aspects of it that are relevant for this Functionalist account. It remains possible, of course, that further empirical evidence will come to light to undermine this theory, but such evidence has not yet emerged, to my knowledge.
6.5 Functionalism and The Distinction Hypothesis

Given the above claim that functional characterizations of KH and KT show significant differences with respect to the two kinds of knowledge, it is natural to see this account as providing further support for the Distinction Hypothesis (i.e. the claim that KH and KT are fundamentally distinct categories of knowledge). Here is a first pass at an argument of that sort:

P1) All KT states are functionally representational
P2) No KH states are functionally representational
C1) Thus, no KH state is a KT state
C2) Therefore, KH and KT are fundamentally distinct categories of knowledge.

The two premises of this argument are meant to follow from the above discussion of the two types of mental state. I take the first premise to be the less controversial of the two, since KT states are commonly taken to be a kind of belief, beliefs are commonly taken to be a kind of propositional attitude, and propositions are commonly taken to be representational. So, it is the second premise that is most likely to be challenged. Why not argue, as proponents of Stanley and Williamson’s account might, that (P2) is false since KH just is a species of KT – i.e. that it is just knowledge of propositions?

I spent a good portion of Chapter 5 explaining why Stanley and Williamson’s argument for this conclusion is weak, and why I believe that it is false. But let me emphasize here the following point: Stanley and Williamson do not argue that instances of KH are straightforward examples of propositional knowledge. Rather, they argue that instances of KH involve knowledge of propositions entertained under a practical mode of presentation. I take that to be something of a concession to the claim that there is a basic functional difference with respect to the two kinds of knowledge state.13

So KH Functionalism provides further evidence for the Distinction Hypothesis, even to

13 Especially given the problems associated with their defense of practical modes of presentation. See Chapter 5, section 5.2 for discussion of those problems.
some extent for those who might be sympathetic to the Stanley and Williamson account of KH. However, the central reason for introducing KH Functionalism is not to provide additional support for the Distinction Hypothesis, but rather to explain KH in general. I take KH Functionalism to be the best account of knowledge-how, and in the next section I list a number of advantages of this account in defense of that claim.

6. 6 Advantages of the Functional Account of KH

6.6.1 Some General Advantages

The functional account of KH described above has a number of general advantages to recommend it. First, it has all the advantages that Functionalism has over the theories of mind that it replaced. For example, it avoids the problems of Philosophical Behaviorism, especially its rejection of minds and mental states. And it avoids the chauvinism that plagues mind/brain identity theories of mind. Both of these advantages are relevant to KH, since a complete account of KH is going to invoke more than just behavior, and since we should allow that beings with brains/central nervous systems unlike our own can nevertheless know how to do certain things. So KH Functionalism is preferable to any account of KH that is grounded in the assumptions of these alternative theories of mind (I discuss Behaviorist-based accounts of KH in a bit more detail below).

Second, as noted earlier, Functionalism is a widely accepted theory of mind, and it is extremely plausible to view knowledge states as mental states. That makes theory of mind a natural framework for the study of knowledge in general, and for the investigation of KH and its relation to KT in particular. It is vastly preferable to grounding the debate within the Intellectualism/Non-Intellectualism dichotomy, as many other accounts of KH do (starting with Ryle), given the absence of a general, philosophical theory of intelligent behavior.
Third, a Functionalist account of knowledge gives weight to our intuitions about KH and KT, as well as to our ordinary experiences (personal, phenomenological, and social); but it also recognizes the defeasibility of that sort of evidence in the face of countervailing empirical considerations. As I argue in Chapter 2, such an approach to philosophy is preferable to a myopic focus on conceptual and/or linguistic analysis alone.\textsuperscript{14} KH Functionalism, then, has an advantage over accounts of KH that do not go beyond these methodologies (some of which I discuss in more detail below).

\textbf{6.6.2 Addressing Some Puzzles and Counterexamples}

A fourth advantage is that the Functionalist approach to KH can explain, and provide plausible responses to, some typical puzzles that are raised that involve KH. For example, those who equate having KH with having a skill or an ability need to deal with concerns about (for example) championship athletes who lose their limbs in traumatic accidents, or successful coaches who nevertheless lack the skills or abilities that they teach their students. Notice that these sorts of counterexamples are roughly analogous to some of the counterexamples raised against Behaviorism as a theory of mind – e.g. the “super Spartan” and “perfect actor” objections – which should not be surprising, given that certain versions of the dispositional “skill/ability” account of KH are roughly analogous to Behaviorism as a theory of mind.

The \textit{super-Spartan} example involves a being who feels intense pain, but behaves perfectly normally, so that an outside observer would never know that the super-Spartan is feeling pain. Behaviorism has difficulty explaining how such a person could really be in pain, since his behavior indicates otherwise. A Functionalist, on the other hand, can point to the inputs and connections to other mental states as being the same as a person in pain and conclude that

\textsuperscript{14} This version of Functionalism, which takes empirical evidence into account, is often called Psycho-Functionalism, or alternatively, A Posteriori Functionalism. I discuss and defend this version in more detail below.
something is playing the functional role of pain within the super-Spartan.\textsuperscript{15} Or, alternatively, if it were determined that the super-Spartan really did lack the appropriate connections to other mental states, and as a result had different behavioral outputs, the Functionalist could concede that the super-Spartan is not really in a pain state at all.\textsuperscript{16}

The \textit{perfect actor} example involves someone who behaves exactly as if she were in pain, though she is not. The Behaviorist has a hard time explaining why the perfect actor is not really in pain, given that her behavior is exactly like a person in pain. However, a Functionalist can explain the difference between the actor and the person who is really in pain quite easily. The actor’s mental state has different inputs, and different connections to other mental states than the person who is truly in pain. The actor’s mental state is not caused by trauma, but rather by taking on a role in a play. The actor’s mental state is not connected to a desire to avoid that state in the future, or emotional states like anger, anxiety and fear. So the actor is not really in pain, according to the Functionalist account, because there is nothing within the actor that is playing the functional role of pain.

The analogous objections to KH as skill/ability are as follows. Consider an Olympic-caliber swimmer who loses her legs in a car accident. Should we say, of such a swimmer, that she knows how to swim, post-accident? This example is roughly analogous to the super-Spartan case. In both cases, most of the parts of the functional role are there, though the output varies from the typical output associated with that functional role. The super-Spartan does not demonstrate pain behavior and the injured swimmer does not demonstrate swimming behavior. Nevertheless, the Functionalist in both cases can point to the inputs and connections to other mental states and conclude that something within both the super-Spartan and the injured

\textsuperscript{15} Though the traditional outputs of pain behavior are being overridden by defeating beliefs and/or desires in the super-Spartan – such as the desire to stay true to one’s values.

\textsuperscript{16} Note the role that empirical research would play in making such a determination.
swimmer is playing the respective functional role, though the outputs are absent because of certain defeaters that are present. On such an analysis, we should conclude that the super-Spartan does feel pain, and that the injured swimmer does know how to swim.

Alternatively, as suggested in the super-Spartan case above, if it is determined that the swimmer’s mental state is functionally different in significant ways (perhaps the absence of legs means the absence of the appropriate proprioceptive states required for swimming), then we should perhaps conclude that the injured swimmer does not know how to swim, though she obviously once did.

Another puzzle that arises with respect to KH is about if and when we should ascribe KH to non-human animals. Again, KH Functionalism offers a plausible means of answering such questions. For example, consider a being(s) that perfectly demonstrates certain abilities – such as bees pollinating flowers, and making honey. Why not classify bees as knowing how to do these things? \[17\] Such cases are analogous to the perfect actor counterexample to Behaviorism in that the output (exercise of an ability) is identical to the output of a being to which we would readily ascribe KH – just as the output of the perfect actor is identical to someone who is actually in pain. However, the inputs are not present in the case of the bee as they are in the case of genuine KH possession. The bee works on instinct alone, and never goes through a process of learning how to pollinate flowers or make honey. There are cases, however, in which animals do go through such a process – for example, a dog learning how to catch a Frisbee – and it is much more natural in such cases to ascribe KH.

So KH Functionalism implies that it is possible for at least some animals to possess KH in at least some cases. This seems plausible and in accord with our intuitions and general

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\[17\] Strictly speaking, that is. People might casually ascribe KH to beings acting on instinct, but as a general rule instinctive or automatic behaviors are not considered instances of knowledge.
practice of ascribing knowledge. However, both dispositionalists and some intellectualists about KH will face difficulty in arriving at such a view. Dispositionalists will have difficulty for the same reason Behaviorists will have difficulty with the perfect actor scenario, while intellectualists will have difficulty since their view implies that it is only possible for animals to have KH if they have the relevant KT. While we do ascribe KT to non-human animals (e.g. “my dog knows that his dog food is in the pantry”), it is a much knottier question as to if and when we should do so literally, given that KT involves a grasp of concepts, and it is simply not clear to what extent non-human animals have such a grasp.  

You may disagree with the specific solutions I have offered to these puzzles and counterexamples provided above. However, the more general point is that the Functionalist perspective gives us a roadmap for investigating and resolving these types of cases. When faced with a question such as “does being $p$ know how to do action $x$?”, we can reply with the question, “is there something within being $p$ that is playing the functional role associated with knowing how to do action $x$?”. These are questions that we know, in principle, how to answer – or, at least, we know how to look for an answer. Looking for such answers is going to involve conceptual and linguistic analysis, since that is how we typically begin to define the functional role associated with some concept. However, it leaves room for empirical investigation as well, since the results of conceptual and linguistic analysis can be incomplete, inconclusive, inaccurate, misleading, inconsistent, etc.

Also, generally speaking, Functionalism can explain why certain cases are puzzling in the first place. Functional characterizations of mental states are complex, with distinct components and subcomponents. The puzzling cases generally involve examples in which some of the

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18 I mention this in Chapter 5, citing Noë (2005), and argue that it provides support for an empirical approach to the study of knowledge, since empirical investigations can inform the discussion about concept-possession in non-human animals.
components of the mental state (as functionally characterized) are present and some are absent.
For theories of KH that lack this complexity (for example, accounts that identify KH straightforwardly with abilities, or with a relation to some proposition), puzzling cases often amount to counterexamples or potentially fatal objections. Advocates of such theories are often forced to deny obvious truths, redefine terms in implausible ways, or radically alter their accounts. KH Functionalism, on the other hand, provides the tools to diagnose such problems and points the way to a solution.

6.6.3 Addressing Some Further Puzzles

There are other cases and examples that are typically raised as problems or puzzles for accounts of KH. I want to say a bit about how KH Functionalism could handle such cases, and thereby demonstrate some further advantages of this account.

An account of KH needs to distinguish between knowing how to do things and merely having a capacity or ability. For example, I have the ability to digest food, but it would seem silly to ascribe to me knowledge of how to digest food. In other words, not every activity we perform is an instance of KH, and so an account of KH should be able to distinguish such things. The Functionalist account of KH can easily distinguish between such activities, though – as noted above in the discussion of non-human animals. The reason I know how to ride a bicycle but not how to digest food is because the state that corresponds to digesting food is not functionally like the state that corresponds to knowing how to ride a bicycle. Most significantly, there is no learning, practice, or rehearsal involved in acquiring the ability to digest food, and the output of a KH state is, of course, not digested food. Additionally, when considering connections to other states, the story with digestion will be completely different from the story with knowing how to ride a bike. Digestion need not have any connections to mental states at all. So the
Functionalist account of KH can readily distinguish between KH states and other types of “activity states”.\(^{19}\)

Another potential puzzle for accounts of KH involves cases of accidental success. For example, imagine someone who never threw a dart at a dartboard before, who nevertheless throws a perfect bulls-eye on his first attempt. Should we say of such a man that he *knows how* to throw a bulls-eye? Or, consider a person who believes herself to be in a tidal wave and thus begins to swim, but is really in an avalanche, with snow instead of water. Yet, completely unbeknownst to this person, swimming motions turn out to be an appropriate way of riding out an avalanche. Should we say that this woman *knows how* to survive an avalanche?

In the dart thrower case, the Functionalist could pretty easily reject the ascription of KH, since there was no rehearsal or practice aimed at successful dart-throwing. Also, with respect to output, one accidental success is not enough to demonstrate a skill or ability, which would require repeated success.\(^{20}\) The reason we might be tempted to ascribe KH to such a person is that certain elements of the functional role were present – for example, one successful outcome, and some relevant connections to other mental states (including the relevant KH state of knowing how to throw a dart).

In the avalanche case, a KH Functionalist would likely say that the woman *does* know how to survive an avalanche, since she knows how to swim (that is, there is something within her playing the functional role associated with knowing how to swim), and swimming is a way of surviving an avalanche. The reason we might be tempted to say that she does *not* know how to

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\(^{19}\) This is why a KH Functionalist should reject the Nemirow-Lewis “know-how” or “ability” solution to Jackson’s knowledge argument for physicalism. There is nothing in Mary playing the functional role of KH, though Mary’s mental state is similar to KH in important ways – especially in that if Mary can be said to acquire knowledge when she sees a red rose, that knowledge seems non-propositional, as is KH. That is, perhaps, why it is an appealing attempt at a solution.

\(^{20}\) Or the ability for repeated success – i.e. counterfactual success.
survive an avalanche is because she did not know that swimming was a way to survive an avalanche – the connection was accidental. And, of course, Functionalists could argue about whether or not a non-accidental connection is essential to possessing the relevant KH functional role.\(^\text{21}\) It seems to me that we would be more likely to say that she knew how to survive an avalanche but she did not know that she knew how, than we would be to say that she did not know how to survive an avalanche.\(^\text{22}\)

Finally, consider the case of an ice skating coach who has had great success in teaching students how to do various complex moves, like triple axels. This coach lacks the ability to do such moves herself, however. Should we say that the coach knows how to do a triple axel? I would argue that the intuition that the coach does know how to do a triple axel stems from the fact that something within the coach is playing a functional role very similar to the relevant KH functional role. The coach would no doubt have spent lots of time practicing and rehearsing complex ice skating moves, would have lots of experience with respect to the relevant proprioceptive states (and so know how to balance, spin, etc.), and would be able to perform a number of complex skating maneuvers, though not the triple axel itself. Additionally, there tends to be a strong (though not necessary) connection between knowing how to do something and being able to teach it, which this example takes advantage of.\(^\text{23}\)

So, again, a Functionalist account of KH is useful both in identifying why puzzling cases are puzzling and indicating how to find solutions. Such puzzling cases are usually puzzling

\(^{21}\) There is an obvious similarity here to the internalist/externalist debate with respect to propositional knowledge.  
\(^{22}\) I guess that would make me an externalist about KH. Another reason these types of examples (i.e. the swim/avalanche case) might test our intuitions is because, as noted in my discussion of a folk theory of KH in Chapter 2, knowledge how to perform a certain skill or ability tends to be pretty specific and non-transferable. So actual cases of this sort would be relatively rare.  
\(^{23}\) That the example depends on the similarity between the coach and a skater who actually has the ability to do triple axels can be seen by conceiving of the coach with less and less skating ability herself. If the coach had very little experience on the ice, and fell down whenever she strapped on a pair of skates, people would be less likely to ascribe KH to her, I would argue – even if she was a successful teacher. The implausibility of such a clumsy skater being a successful coach provides further evidence of the connection we typically intuit between KH and ability.
because certain components of the KH functional role are present while others are absent, thus rendering our intuitions about such cases confused, conflicted, or otherwise flawed. This ability to explain why puzzling cases are puzzling is another mark in favor of a Functionalist account of KH.

6.7 Comparing KH Functionalism to Other Theories of KH

How might those who have put forward other theories of KH/KT respond to the above arguments in defense of KH Functionalism? In this section, I will briefly consider a number of theories of KH (and its relation to KT) and explain why the Functionalist approach is a superior alternative.

6.7.1 Ability Accounts of KH and Ryle’s Dispositionalism

It was Ryle who invigorated the modern debate on KH and KT, and his account of KH was a dispositional account. That is, to know how to do something is to be disposed to behave in a certain way under certain circumstances. Many issues and objections have been raised against dispositional views of KH, including arguments about the ontological status of dispositions. Without dismissing those issues, we can bypass them relatively straightforwardly with a Functionalist account of KH by noting that most dispositional views are analogous, for our purposes, to Philosophical Behaviorism about mental states. And Philosophical Behaviorism with respect to mental states has well-known and seemingly fatal problems – utmost among them are (a) the inability to completely eliminate mental terms from one’s theory of mind, and (b) Behaviorism’s rejection of the existence of mental states as distinct from behavior. Taking a Functionalist stance with respect to KH is superior to taking a dispositional view for all the same reasons (noted above) that Functionalism about mental states in general is superior to Philosophical Behaviorism as a theory of mind.
It might be argued that Ryle’s particular version of dispositionalism is not simply analogous to Philosophical Behaviorism. Ryle does, after all, emphasize the sorts of inputs that give rise to KH – rehearsal, practice – and contrasts those with reflexes and habits. And he insists that KH is not merely a single-track disposition, but can rather be manifested in complex ways. Additionally, Ryle sometimes emphasizes connections with respect to KH and other mental states – e.g. he notes that “understanding is a part of knowing how”. But he also tends to define such mental states in behavioral terms (e.g. he explains understanding as it relates to KH in terms of “some degree of competence in performance of that kind”).

It is, perhaps, possible to view Ryle’s dispositionalism with respect to KH as a version of Functionalism (or proto-Functionalism), given that Ryle is not merely focused on characterizing KH in terms of behavioral outputs, but is rather analyzing, more generally, something like the functional role that KH plays. And, to be sure, Ryle pointed out many ways in which KH and KT are functionally distinct (e.g. “truths can be imparted, procedures can only be inculcated”). On the other hand, Ryle’s tendency to reduce mental talk to behavioral talk makes me hesitant to see him as a sort of Functionalist, despite the above considerations.

The issue of how to categorize Ryle’s view need not be settled now. It will suffice, at this point, to conclude that Ryle’s dispositional account should be praised to the extent that it moved beyond what we might call Single-Track Dispositionalism and towards something more akin to KH Functionalism. Furthermore, it should be pointed out that logically, Dispositional accounts of KH could be Functionalist accounts, if the relevant disposition was cashed out in functional

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24 See, for example, Ryle (1949), pp. 45-51.
25 Ibid, p. 54.
26 Ibid, p. 59. This is of course a way that KH and KT are functionally different in the very broad sense, rather than in the sense of a functional characterization of a specific mental state.
27 The debate about Ryle’s views began right after he published his works on KH and KT – some of that early back-and-forth on the matter is discussed in the Introduction to this dissertation. That debate continues today, with some (e.g. Stanley and Williamson) arguing for a Behaviorist reading of Ryle while others (e.g. Weatherson (2007)) argue against it. The first chapter in Stanley (2011), called “Ryle on Knowing How”, discusses the modern debate.
terms. For example: “knowing how to ride a bicycle is the disposition to exercise bicycle-riding behavior given certain inputs (e.g. practice, rehearsal) and connections to other mental states.” However, given the traditional association of dispositions with behavioral output, and of Dispositionalism with the rejection of the mental, we should resist conflating Dispositionalism and Functionalism.

6.7.2 Bengson and Moffett’s Account of KH

As discussed previously in this dissertation, Stanley and Williamson argue for the view that KH is a species of (though not reducible to) KT. They claim that a KH ascription, such as “Hannah knows how to ride a bicycle” is true if and only if Hannah knows that such-and-such is a way to ride a bicycle under a practical mode of presentation. I discussed and criticized their account at length in Chapter 5. And I have presented a Functionalist argument above against the conclusion that KH is a species of KT. This argument generalizes to accounts of KH that involve claims that one type of knowledge reduces to the other, or is identical to the other.

Philosophers John Bengson and Marc Moffett have recently offered an account of KH that they call both Non-Propositional Intellectualism and Objectualist Intellectualism (hereafter OI). Their goal, they write, is “to develop a view of knowledge how that has the resources to account for its simultaneously practical and cognitive character.” More specifically, they attempt to develop an account of KH that respects all three of the following claims:

i. Knowing how is not merely a kind of knowing that.
ii. Knowing how is practical: it bears a substantive connection to action.
iii. Knowing how is a cognitive achievement: its status as a piece of practical knowledge is not merely coincidental.

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29 Bengson and Moffett (2011a).
31 Ibid, p. 5.
They note that Intellectualist accounts of KH (those accounts that tend to see KH as a kind of KT) tend to deny (i) and sometimes (ii). Non-intellectualist accounts (those accounts that tend to see KH as merely a disposition, or ability, to perform a skill or activity) tend to deny (iii). Their solution, as its name suggests, tries to split the difference. Bengson and Moffett’s idea is to stick with the Intellectualists with respect to (iii), and to go with the Non-intellectualists on (i) and (ii). In other words, they see KH as a substantial cognitive achievement, which is not a kind of KT and which is practical. Here is a summary of their account:

To know how to x is to stand in an objectual understanding relation to a way w of x-ing, where such understanding consists in objectual knowledge of w together with an objectual grasp of (having reasonable mastery of the concepts in) a correct and complete conception of w.\(^{32}\)

KH, for them, is an objectual attitude, which is an attitude “grounded in (possibly tacit) propositional attitudes, though it is not itself reducible to or a “species” of propositional attitude.” \(^{33}\) Knowledge of how to do something, on their account, is not knowledge of a proposition, but rather knowledge (or understanding) of an object (hence the term “objectual attitude”) – namely, the way of doing that thing. Since knowledge/understanding of a way is not reducible to, or a species of, propositional knowledge, KH is not merely a kind of knowing that. But since it is knowledge, it is a cognitive achievement, and since it is knowledge of a way of doing something, it is also practical. Thus does Bengson and Moffett’s account preserve all of (i) – (iii) above.

There is much to like in Bengson and Moffett’s account. For example, in my discussion of Stanley and Williamson’s account of KH in Chapter 5 above, I also suggested that KH is better described as knowledge of a way, rather than as knowledge that such-and-such is a way, as Stanley and Williamson’s account has it. However, the advantages of their account can be found

\(^{32}\) Pg. 28.
\(^{33}\) Pg. 28.
in the Functionalist account described above, which has none of the disadvantages of their account.

The main advantage of their account, as they note, is that it can simultaneously respect all three central intuitions about KH: (i) that it is not merely a species of KT; (ii) that it is practical; and (iii) that it is a cognitive achievement. But KH Functionalism respects and explains all three intuitions as well. According to the Functionalist account of KH, knowing how is not merely a species of KT since they play significantly different functional roles; KH is practical in that it has practical outputs – i.e. the typical output of a KH mental state is the exercise of an ability or skill; and KH is a cognitive achievement since its inputs involve learning, which is a cognitive achievement.

Additionally they cite, as an advantage of their account, that it allows them to address the various counterexamples and puzzling cases that arise with respect to KH. As I have demonstrated above, KH Functionalism addresses such cases, too – and does so without the introduction of ad hoc ontological entities such as appear in Bengson and Moffett’s account.

The disadvantages of their account stem from the fact that they are still approaching the issue using the methodologies of conceptual and linguistic analysis. This forces them to introduce an entity, an objectual attitude, that is grounded in propositional attitudes in some way (thereby giving it cognitive heft), and yet which is not a kind of propositional attitude itself (thereby giving it the freedom to be practical in a way that mere KT cannot be). Their justification for introducing such an entity (as well as other entities that are introduced and defined in their paper, such as conceptions, ways, etc.) stem from concerns derived from conceptual and linguistic analysis alone. That is perfectly defensible way of proceeding, of course, but the actual existence of such entities never really gets tested against reality. Why
should we actually believe that things like objectual attitudes exist? We are not given much of an explanation that goes beyond the claim that they must exist in order to prop up our intuitions about KH (and its relation to KT).

The Functionalist account of KH does give weight to these intuitions, and to conceptual and linguistic issues as well. But it also checks those intuitions and conceptions against the available empirical data in a way that Bengson and Moffett’s account does not. As such, the Functionalist account of KH has a significant advantage over Bengson and Moffett’s Objectual Intellectualism.

To give a specific example of what I am talking about, in Chapter 3 I discuss the neurological evidence with respect to the nature of KH and its relation to KT. I introduce numerous, well-documented cases of patients, such as Henry M (who has a certain sort of amnesia), who demonstrate the ability to acquire new KH but not new KT. On the face of it, both a Functionalist account and OI could explain this fact. When Henry M acquires the ability to do the Tower of Hanoi puzzle, for example, the Functionalist could say that Henry M knows how to do the puzzle, since Henry M has a mental state that is playing the functional role of KH. There are appropriate inputs (learning, practice, rehearsal, etc.), connections to other states, and outputs (solving the puzzle).

However, with respect to propositional knowledge, it is not the case that something is playing the relevant functional role in Henry M. The inputs are there (for example, he learns the name of the puzzle and the rules of the puzzle, which last for a brief time in short term memory), but the connections to other mental states are never made, and so the knowledge that such-and-such is a way of solving the puzzle – never gets stored in long-term memory. As such, Henry M

\[\text{34 In fact, Moffett argues against the notion that empirical results can inform our functional characterizations of mental states. See section 6.9 below, where I address Moffett’s argument.}\]
does not have propositional knowledge about the Tower of Hanoi puzzle, even though he knows how to solve the puzzle.

Now, since Bengson and Moffett argue that possessing KH is just possessing an objectual attitude, and that objectual attitudes are grounded in propositional attitudes, they are going to have a problem explaining Henry M, since it seems implausible that Henry M has any propositional attitudes with respect to the Tower of Hanoi puzzle. They might argue that Henry M does have such propositional attitudes, but that they are merely tacit, but again the motivation for such a claim would be to respect our intuitions and the results of conceptual analysis in the face of empirical evidence to the contrary. For reasons I have explained in earlier chapters, I believe that to be a wrong-headed approach to the problem.

A final note on Bengson and Moffett’s account – the manner in which they preserve intuition (iii), which is the claim that possessing KH is a cognitive achievement, is to argue that KH is knowledge of a way, and that ways are objects of a certain kind. So the cognitive achievement of KH involves the existence of a relation between the mind (or more specifically the understanding) and an object. KH Functionalism, on the other hand, holds that possessing KH is a cognitive achievement because one must learn (i.e. practice, rehearse, etc.) how to do something in order to know how to do it. Bengson and Moffett resist this move, using a swampman-type example to illustrate their point. They argue that if some agent, A, knows how to x, then surely his swampman counterpart (who is particle-for-particle duplicate of A, but who has just now popped into existence) knows how to do x as well. Therefore, A’s history is irrelevant to his knowing how to do x. I discuss such cases below when I consider the possibility of a priori KH, but I do not find such counterexamples very convincing. While it is perfectly plausible that our intuitions might lead us to ascribe KH to the swampman counterpart, that

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would be because of the similarity of the counterpart to the agent A, who did learn how to do $x$. In other words, it would certainly appear as if the counterpart has something playing the functional role of knowing how to $x$. But a being who was just created seconds ago and proceeds to demonstrate the ability to perform complex activities would be more like an animal acting on instinct or reflex than an agent demonstrating a cognitive achievement.

To illustrate this point, imagine a race of beings exactly like humans, except that food digestion does not occur automatically in its members. They have to learn how to digest food. This learning process involves consciously controlling bodily motions of certain sorts while one eats, and swallowing food and drink in certain ways, etc. – all the things that humans and their bodies do automatically when we eat and digest food. At the end of this process, the aliens have mastered digestion and can now do it “without thinking about it”. An alien who has come to master digestion in this way is a physical duplicate of an adult human being, who never had to go through this learning process. I would argue that in this case it would be appropriate to describe such a being as knowing how to digest food, while it is inappropriate to say the same thing about a human being.

6.7.3 JTB-Type Accounts of KH

Another type of account of KH that appears in the literature is modeled on the JTB, or justified, true belief, account of propositional knowledge. One such view is proposed by Katherine Hawley, who claimed:

Just as propositional knowledge can be understood in terms of true belief plus warrant, knowledge-how can be understood in terms of successful action plus warrant.\(^{36}\)

\(^{36}\) Hawley (2003), p. 19. Similarly, David Carr provides an account of KH with structural similarities to the JTB account of propositional knowledge (see Carr (1981), p. 58) which I discussed briefly in Chapter 5.
Such accounts generally conceive of KH as aiming at success (or, more specifically, counterfactual success at performing some activity, or demonstrating some ability) whereas KT aims at truth. I take that to be consistent with, and to provide some measure of support for, KH Functionalism’s central claim, which is that KH and KT states play distinct functional roles, and thus that neither is a kind of, or species of, the other.

On the other hand, such accounts are flawed given the distinctions between the two kinds of knowledge described above. There is nothing in KH, for example, to play the role that belief plays in the JTB account of KT (a point that Hawley passes over without mention). As I have been arguing throughout this dissertation, KH states are non-propositional and thus non-representational and so they are not a kind of belief in the way that KT states are. They are, rather, practical.

Similarly, the notion of justification is not obviously applicable to KH in the way it is to KT. The request that someone justify a belief is a request for good reasons as to why that person holds that belief. But a request for good reasons as to why a person knows how to do something makes little sense. In the quote above, Hawley uses the term “warrant” rather than justification – intending it to refer to whatever must be added to true belief to get KT. Her analog for KH is whatever must be added to successful action to turn something into KH. Specifically, Hawley argues that success can be accidental, and so a requirement must be added to success in order to distinguish KH from accidental success. This is a pretty attenuated sense of the term warrant, which undermines the claim that there are significant structural similarities between the two kinds of knowledge.

Hawley is correct to point out (as I do above), that considerations of accidental success lead to something like an internalist/externalist debate about KH. With respect to KT, an
externalist says that what is required for justification of a belief is a reliable belief-forming method (whether or not the reliability of the method is accessible to the believer); whereas an internalist requires that the basis for belief be accessible to the believer. In the case of KH, the analog of the externalist would hold that the agent need not know that such-and-such is a way to successfully do $x$ in order to know how to do $x$, whereas the analog of the internalist would disagree. But this observation is not an advantage of a JTB-type account over KH Functionalism, since the same observation arises within KH Functionalism. And JTB-type accounts provide no solutions to the KH-internalism/externalism debate that are not available to other accounts. In short, then, JTB-type accounts of KH are implausible given that their *raison d'etre* is the claim of significant structural similarities between KH and KT that do not actually exist. Such accounts provide no compensatory advantages that might make up for this deficit.

### 6.8 Potential Objections to KH Functionalism

There are a number of potential objections that might be raised against KH Functionalism, some of which I have indicated above. I want to briefly address two of those which I take to be the most likely to arise. The first is about the possibility of a priori KH – or, possessing KH independent of experience. The second is about non-physical examples of KH, such as knowing how to reason, think, do math problems in one’s head, etc.

#### 6.8.1 A Priori KH

Above, I argue that practice and rehearsal are necessary inputs for KH. That is, in order to possess KH with respect to some activity or skill, such as riding a bicycle, it must be the case

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37 This is extremely oversimplified, but the details (and different versions of internalism and externalism) are not relevant for present purposes.

38 To illustrate, consider the *Karate Kid* example, where the teacher, Mr. Miyagi, makes his student, Daniel, paint fences, wax cars, etc. Daniel gets angry that he is not being taught how to do karate, but unbeknownst to Daniel, the way to paint a fence is also the way to block a punch in karate. A KH internalist would say that Daniel does not know how to block a punch since he does not know that the way to paint a fence is also a way to block a punch. A KH externalist would say that Daniel knows how to block a punch since he knows a way to reliably block a punch, even though he does not yet know that he knows such a way.
that at some point one learned how to ride a bicycle, and typically that learning process involves practice and rehearsal. This process of learning how to do $x$ is, I would argue, much of the reason why the state that results deserves the name “knowledge”. That is, the reason that possessing KH is conceived of as a cognitive achievement is, in large part, due to the cognitive effort that goes into learning how to exercise the relevant ability.\textsuperscript{39} This claim has some implications that might seem controversial at first glance, but it can, I think, be defended.\textsuperscript{40}

For one thing, if practice and rehearsal are necessary in acquiring KH, it might seem that the possibility of a priori KH is being ruled out. That is because practice/rehearsal is a form of experience, and if practice/rehearsal is necessary for possessing KH, then it follows that one cannot have KH independent of experience. Thus, all KH is by definition a posteriori.

In response, it should first be pointed out that the terms a priori and a posteriori generally apply not to the way in which knowledge is acquired, but rather in the way it is justified. In other words, what makes a bit of knowledge a priori is that it can be justified without reference to particular empirical facts or experiences (to massively oversimplify things). One can know a priori that triangles have three sides so long as one understands the meanings of the relevant terms; one need not go out into the world and survey actual triangles. Talk of justification, though, again raises the point just made above – namely, the notion of justification does not seem applicable to KH in the way that it does to KT. While one can ask for someone’s justification for her belief that $p$, there is no corresponding request one can make with respect to KH. It is not clear how one might respond to a demand that one justify one’s knowledge how to ride a

\textsuperscript{39} The learning process, for KH, can be very brief, but is often extended, and one continues to learn even as one exercises the learned ability. I discuss this aspect of KH in previous chapters, especially Chapter 4. It is interesting to note that certain instances of KH, once learned, can be exercised “without thinking” – i.e. without further cognitive effort. Abilities such as walking and talking are like this for most of us, but even complex behaviors, such as driving a car, can have that character for those with enough practice.

\textsuperscript{40} And I have already had some things to say in defense of this view in section 6.7.2 above in discussing Bengson and Moffett’s account of KH.
bicycle. This is because, I would argue, KT is a kind of belief, and beliefs are propositional attitudes. If I believe some proposition, \( p \), I am taking a particular attitude (something like acceptance or affirmation) towards that proposition (which is representational). That is, I am accepting/affirming that the proposition accurately represents the world. It makes perfect sense for someone to ask for a justification for that attitude. It amounts to asking why I am taking the attitude that I am towards that proposition (that is, it amounts to asking why I think that the proposition accurately represents the world). But KH is neither representational nor an attitude. Knowing how to ride a bicycle is not, primarily, knowledge about the accuracy of a representation. And knowing how to ride a bicycle is not, primarily, an attitude I take towards something. It is primarily practical – aimed at action. As such, it does not make sense to ask for a justification of it.

So, strictly speaking, there is no such thing as a priori KH since it makes no sense to talk about how KH gets justified, because the notion of justification does not apply to KH. However, the question of whether or not one could acquire KH independent of experience is still an open question. It might be argued that there are things we know how to do independent of experience – for example, basic bodily movements, instinctual behaviors (e.g. sucking, crying), and the like. We are just born knowing how to do such things, it might be claimed – we do not have to learn how to do them.

There are two sorts of things one might say in response to such examples. First, as noted above, we do not generally use KH terminology to refer to instinctual behaviors. We do not say things like, “look at the baby, he knows how to cry”, rather we say “the baby is crying”. A similar point can be made with respect to instinctual behavior in animals. We do not typically

\[ 41 \text{ Cf. section 6.7.3 above.} \]
think, for example, of bees as *knowing how* to pollinate flowers, or make honey. These sorts of considerations amount to some evidence that if an activity is not learned via experience, we do not consider it KH.

Second, many of the behaviors that we take to be present from birth really are not. As new mothers will testify, breastfeeding is not just a case of putting the infant near the breast and letting instinct take over. It tends to involve teaching the baby the proper way to open its mouth, angle its head, etc. Maternity wards have specialists whose whole job is to facilitate this process. A similar point can be made with respect to basic bodily movements. Newborns tend to move body parts pretty randomly at first, and it is some time before they demonstrate controlled movements of arms, legs, head, etc. Observation of newborns reveals that practice is required before they can do things that adults would consider basic – such as touching/picking up an object in front of them. That practice involves trial and error, but with adjustments made between trials that are based on the errors. So applying KH terminology to such activities is consistent with the claim that KH requires experience.

Still, it might be claimed, it is possible that someone could acquire some KH without going through the process of practice/rehearsal. Consider, for example, a situation such as that in the movie *The Matrix*, in which the character Neo gains the ability to do Kung Fu, not by practicing and rehearsing, but rather by having the “program” for such behavior downloaded directly into his brain via computer. Isn’t this within the realm of possibility – that we could

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42 We do, though, label some animal behavior as KH – and rightly so, on my account. There is nothing to prevent a non-linguistic being from possessing KH according to KH Functionalism (though arguably, non-linguistic beings are unable to possess KT – another potential distinction between the two kinds of knowledge). In general, the closer an animal comes to fitting the functional characterization of KH provided above (especially the learning component), the more likely we are to ascribe KH to that animal. Cf. section 6.6.2 above.

43 Interestingly while it does not sound strange to say of young child that she knows how to walk, such an ascription would sound a bit odd about a normal adult.

44 In the movie, it is not clear whether Neo actually gains the ability to do Kung Fu outside the context of the matrix, but that is the sort of scenario I am envisaging here.
acquire KH via download rather than through practice and rehearsal? And wouldn’t we say of Neo that he knows how to do Kung Fu even though he never learned how? If so, it would undermine my claim above that practice and rehearsal are necessary for KH.

Here is what I think we should say about such cases: first, it seems unlikely that we could actually acquire physical abilities in this way, since they tend to involve bodily components that are not “downloadable” (learning how to do karate, after all, involves more than changing one’s brain states). And no one yet learns complex physical behaviors, such as doing Kung Fu, by “download”. So it is not surprising that such examples would test our intuitions.

But that is not to say that acquiring such abilities directly is logically impossible. The example can always be changed so as to avoid such concerns – e.g. imagine a swampman-type example, as discussed above, or a person created by God who can do Kung Fu without going through the process of learning how to do Kung Fu? That seems clearly possible, that a person could be created with such abilities. But the trickier question is: would such a person know how to do Kung Fu? To the extent that we would answer in the affirmative, it would be, I think, because such a person would be in a state very similar to a KH state, functionally speaking – though not completely like it. Our intuitions about such cases, as noted above (in my discussion of puzzling cases), are not always sharp. But I would argue that we should answer in the negative. That is because KH deserves to be categorized as a kind of knowledge because it is a cognitive achievement. Someone who has never learned how to do Kung Fu and simply performs the motions automatically does not demonstrate such an achievement, and so should not be said to know how to do Kung Fu (despite the similarities such a person would have to someone who does know how to do Kung Fu).
6.8.2 Non-Physical KH

In this chapter, and in the dissertation in general, I have focused, for the most part, on paradigmatic cases of KH, which tend to involve complex physical activity – such as knowing how to ride a bicycle, knowing how to juggle, knowing how to drive a car, etc. But there are clear cases of KH which do not involve such physical activity – for example, knowing how to think/reason, knowing how to do math in one’s head, and knowing how to read a foreign language. How can KH Functionalism handle such cases, given my emphasis on the connection between KH states and physical activity?

First, it is important to notice the ways in which these activities do play the functional role of KH states. They require practice and rehearsal and they lead to the exercise of skills and abilities. So there is significant overlap between these type of KH states and physical KH states. That could explain, at least in part, why we consider such knowledge KH. However, this explanation is not completely satisfying in that these kinds of examples do not seem like outliers, or borderline instances of KH, as is the case with some of the other puzzling examples discussed above. Ascribing KH to inner activities such as thinking, reasoning, etc. seems completely natural.

Second, it is suggestive that we often describe such activities in proprioceptive, or physical, terms. We sometimes talk of thinking, for example, as “flexing our mental muscles”, or reasoning can be described as “wrestling with an opposing point of view.” And it is a cliché among the positive thinking industry to claim that “the brain is a muscle”. In fact the term “exercise”, which applies to both kinds of activity (physical and mental), derives from the notion of executing a power. So while thinking and reasoning do not connect to proprioceptive states in
a literal sense, there is an underlying sense in which they involve “executing powers” that makes them similar to physical activities.

Third, these types of activities tend to be in domains in which representations and activity are very closely linked. Language is a primary tool that we use to represent the way things are in the world, both to ourselves and to others. But thinking, speaking and writing are obviously activities – things we do. So language tightly bundles the functional roles played by KH and KT states. A similar point can be made about mathematics and general reasoning, since math and logic are also tools we use to represent various aspects of the world as well, but also have closely linked activities. Our intuitions about whether to call these sorts of examples KH or KT (or both) might be blurred because of the difficulty of separating the functions associated with each.

I do not pretend that this is a completely satisfying response to this question. In fact, I take the relation between mental and physical activity to be a fertile topic for future research.

6.9 A Posteriori Functionalism

Finally, I want to say a bit about methodology. This is a topic I have discussed at length in earlier chapters, but I want to address it here briefly in the context of different versions of Functionalism.

As should be clear from my above remarks, I take the characterization of the functional role of KH (and other mental states) to be informed by a number of different sources, including conceptual analysis and empirical research and data. Conceptual analysis, along with consideration of ordinary language and experience, is necessary in order to identify what it is, exactly, that we are attempting to explain, investigate, etc. Inquiry, after all, has to begin somewhere, and ordinary concepts, language and experience can provide us with our starting point. In Chapter 2, I used all of those tools, then, to develop a folk theory of KH. In later
chapters, I considered some empirical research that has informed the discussion of KH (and its relation to KT). All of that has gone into my characterization of the functional role that KH typically plays.

The idea that empirical data can inform the characterization of the functional roles played by mental states is central to a version of Functionalism called, alternatively, 

**Psycho-Functionalism** and **A Posteriori Functionalism**. It is not a belief shared by proponents of all versions of Functionalism. Specifically, a version of the theory called Analytic, or A Priori, Functionalism rejects this notion. In this section I will say a bit in defense of A Posteriori Functionalism. I will not go into great detail because (a) this chapter is meant as a very general overview of KH Functionalism rather than a defense of Functionalism in general; and (b) much of what I say in defense of my methodology in Chapter 2 of this dissertation can be adapted, without too much trouble, to a defense of A Posteriori Functionalism.

To repeat, A Posteriori Functionalism allows the characterization of the functional roles of mental states to be informed by empirical findings. For example, a conceptual analysis of the concept of memory might assign certain essential characteristics to memories – e.g. that they are always about past events, that they are visual, etc. However, empirical research might then reveal that some aspects of this conceptual analysis are wrong, or incomplete, or not universal. For example, it might be discovered by physicists that exposure to tachyon fields instills in some people memories of the future (to use a common science fiction trope); or that memories can take forms corresponding to multiple modes of perception, not just vision.\(^{45}\) As such, various aspects of our memory concepts may then need to change.

\(^{45}\) The example is hypothetical, used to illustrate the differences with respect to the two kinds of functionalism. I do not mean this as an actual story of how our concept of memory has changed, or should change.
How might this be problematic, from a Functionalist perspective? Well, one of the virtues of Functionalism— and a major reason it has come to be so widely accepted—is that it allows us to avoid the chauvinism objection that arose with respect to Identity theories of mind. Those theories were chauvinistic because they identified mental states with human brain states, which implied that beings without human brains would necessarily lack minds/mental states. Yet it seems that we should leave room for the possibility that animals with different brains from our own (not to mention silicon-based aliens, supercomputers, androids, etc.) nevertheless have (at least some) mental states. Functionalism saves the day by ignoring the material constitution of the substratum and characterizing mental states by way of functional role only. As long as something within a being is playing the functional role of (for example) pain, that being is in pain—whether it is composed of gray matter, silicon, or green goo.

So far, so good. However, if we now allow empirical findings to shape our characterizations of the functional roles of mental states, as in A Posteriori Functionalism, it seems that we are heading back towards a form of chauvinism. After all, empirical research is done on actual organisms with specific kinds of brains. How can we know that the features of those organisms’ brains are universal? It might simply be a quirk of humans (and other actually existing organisms) that we have certain psychological properties. But if we now write those properties into the functional characterizations associated with mental states, then it seems that we are stacking the deck towards the kinds of brains we have studied, and closing off possibilities of other types of mental-state instantiations that should be left open.

So it seems that to avoid chauvinism the Functionalist must fall back on the results of a priori methodologies (e.g. conceptual analysis), and ignore the results of empirical investigations if they conflict with the results of a priori methodologies (or, perhaps, insist that the empirical
investigators are simply talking about different things, since their use of concepts does not match up with conceptual analysis). However, the problem with that response is that it does away with the plausible notion that empirical results are (and have been) useful in characterizing the functional roles of mental states, which is what motivates A Posteriori Functionalism in the first place. Here is Marc Moffett’s summary of the A Posteriori Functionalist’s dilemma:

I will argue that the a posteriori functionalist faces the following dilemma: either she must adopt the results of cognitive science wholesale (in which case her functional definitions will be unacceptably chauvinistic) or she must admit that the psychological principles relevant to giving functional definitions of the mental properties and relations can, at least in principle, be settled by a priori methods (in which case her position will be self-defeating).46

A Priori Functionalists avoid this dilemma, obviously, by embracing the second horn — i.e. the view that definitions of mental properties and relations can, at least in principle, be settled by a priori methods. How does that work in practice? Well, in the memory example, an A Priori Functionalist could simply deny the claim that “memories” of the future are actual memories, since they lack essential characteristics that mental states must have in order to be memories (e.g. that they must be about the past). It is not that A Priori Functionalists have to deny that new and interesting things happen when humans are subject to tachyon fields – that is, they are not refusing to see the results of science. Rather, the A Priori Functionalist is claiming that whatever the scientists have discovered in subjects who have been exposed to tachyon fields, it is not memories.

This objection to A Posteriori Functionalism contains some kernels of genuine concern, but it is not a compelling reason to reject this version of the theory. One genuine concern is that an overly narrow focus on empirical data will lead to an overly chauvinistic characterizations of mental states, and thus lead to a refusal to see the same kinds of states in beings that are different

from us. The flip side of that concern is that if we reject a priori considerations altogether, we will simply end up changing the subject rather than performing a substantive investigation into the issue at hand. Again, to investigate some phenomena, we must agree, to some extent, upon what it is we are investigating – and we need to use a priori methods for this identification.

However, A Posteriori Functionalism (as I am conceiving of it here) is in a position to respond to these concerns. As has been emphasized throughout this dissertation, we should not reject the results of a priori methodologies, such as conceptual and linguistic analysis. A reasonable A Posteriori Functionalism will take those results into account. But it must be noted that these “a priori” methodologies are not completely a priori. Both conceptual and linguistic analyses involve activities that can be legitimately characterized as empirical. Conceptual analysis involves investigating the content of concepts by observing linguistic behavior – e.g. by determining the sorts of things people (i.e. human beings) would be willing (and unwilling) to assent to. Linguistic analysis involves, for example, investigating linguistic structures to determine relations between concepts (as Stanley and Williamson do in defense of their claim that KH is a kind of KT). These methodologies are not free of the kinds of biases that can lead to chauvinism, since our concepts, language, imagination, etc. all develop in specific contexts that affect their content.\footnote{47 In the chapter on Stanley and Williamson, I discuss some criticisms of their account based on differences in KH & KT ascriptions across different languages.} Such biases inform our ideas about possibility and necessity as well.

Additionally, the results of such a priori investigations can be problematic in a number of ways. For example, our pre-theoretical intuitions about certain concepts might conflict with pre-theoretical intuitions about other concepts; they might contain internal contradictions; they may be revised upon receipt of new information; they may change as our paradigms change; etc. For
these kinds of reasons, empirical research is generally needed to supplement these a priori methodologies.

Furthermore, A Posteriori Functionalism does not proceed merely by studying and considering human minds, but rather by studying and considering all available minds (and candidates for minds – e.g. computers), and attempting to extrapolate from those experiences to general conclusions. Or, put another way, A Posteriori Functionalists believe that empirical research can lead to new ideas about the nature of certain mental states in general. It might demonstrate that our pre-theoretical concepts were too broad, or too narrow, or did not cut nature at its joints. Of course there is always the danger that mistakes will be made, or that A Posteriori Functionalists will fail to account for legitimate possibilities. But the spirit of the venture is some insurance against chauvinism, since the A Posteriori Functionalist is much more likely to revise her theory in the face of new evidence, while the A Priori Functionalist is more likely to reject empirical discoveries as a reason to revise our concepts.

How exactly, then, should the A Posteriori Functionalist respond to Moffett’s dilemma? It might help to consider how Moffett’s argument would apply to other domains besides cognitive science. Take for example the characterization of the astronomical entity “planet”. This is an entity that is characterized functionally; planets, after all, have all kinds of distinct material constitutions. The term “planet” comes from the Greek word for “wanderer”, and all of the heavenly bodies that moved against the fixed background of the “stars” were considered planets by the Greeks – including the sun and moon (but not the earth, since it was not believed to be in motion). A posteriori research contributed significantly to the development of a new astronomical paradigm – one in which the sun is at the center of the solar system, the earth is in motion, and the varieties of astronomical entities multiplied. Nowadays, of course, the term
“planet” has a very different meaning than it did for the ancient Greeks, thanks in large part to results of empirical methods.

Now, if we apply Moffett’s argument to this example, we get something like:

…it the scientist faces the following dilemma – either she must adopt the results of astronomy wholesale (in which case her functional definitions will be unacceptably chauvinistic), or she must admit that the principles relevant to giving functional definitions of astronomical objects can, at least in principle, be settled by a priori methods (in which case her position will be self-defeating).

If astronomers had accepted the second horn of Moffett’s dilemma, and insisted that a priori methods always settle such matters, they would be stuck insisting that the earth is not a planet while the sun and moon are planets (because that is just what the term “planet” means and that is how everyone used that term). But neither did astronomers simply accept the results of astronomy wholesale – which would have, presumably, involved getting rid of the Greek notion of “planet” altogether in light of the new paradigm. That, of course did not happen. What did happen is that the concept “planet” changed, to a large extent as a result of empirical methodologies. So Moffett’s dilemma is really a false dichotomy, at least as applied to astronomy. There is an alternative option available to the A Posteriori Functionalist that involves a complex interplay between a posteriori and a priori methodologies.

Moffett might argue that cognitive science is importantly different from astronomy, and other empirical domains, but it is unclear as to why that should be the case. Certainly we are more intimately connected to mental states than we are to astronomical objects, but in all scientific domains investigators are forced to study what they can see, observe, measure, etc. and extrapolate (or interpolate) from there.
This is, of course, a huge topic and difficult to do justice to in short space. The debate, as noted above, is closely related to the discussion of methodology that I present in Chapter 2, and I refer the reader there for further discussion.

6.10 Conclusion

In this chapter, I have put forward a proposal for how best to understand and further investigate the nature of KH, and its relation to KT. My proposal, KH Functionalism, has significant advantages over alternative approaches – especially that it honors our basic intuitions about the different kinds of knowledge, it allows for empirical evidence in characterizing the types of knowledge, and it provides solutions to or explanations of many of the puzzling cases that arise with respect to this topic. Much remains to be said about the details of this proposal. I have introduced my account at a very general level, and pursuing the specifics is an ongoing project. It is my hope that I have provided enough of a picture so as to convince you that the Functionalist program is the appropriate domain for pursuit of this topic.
Bibliography


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