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Understanding Knowledge in a New Framework: Against Intellectualism as a Semantic Analysis and an Analysis of the Mind

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Abstract

Since Stanley and Williamson 2001 rejected Ryle's well known dichotomy of knowing-how and knowing-that and argued for an intellectualist approach of knowing-how—i.e. for the thesis that knowing-how can be explained in terms of propositional knowledge—the persuasiveness of intellectualism has been revisited in various disciplines such as epistemology, philosophy of mind, psychology, and cognitive science. The aim of this paper is to show that two forms of intellectualism can be distinguished that are often admixed in recent debates. One kind of intellectualism is related to what can be called the "semantic project", the second one to the "knowledge representation project". We will argue that the first kind of intellectualism neglects the pragmatics of our language use whereas the second kind is not able to bridge the so-called "Knowledge-Action-Gap". Moreover, we will propose a new theoretical framework by distinguishing two forms of knowledge (practical and theoretical knowledge) and three knowledge formats (propositional, sensorimotor and image-like) that refer to different ways information constituting knowledge can be represented. We will try to show that our new framework allows for investigating the phenomenon of knowing-how as a common topic of philosophy and cognitive sciences.

5.1 The Rylean Approach to Knowing-how and Knowing-that

When Ryle introduced his seminal dichotomy of knowing-how and knowing-that (cf. Ryle 1945 & 1949) he didn't know that his view would become focus on discussion during the turn of the 20th to the 21st century in philosophy, psychology and cognitive science. Ryle argues against a fictitious position he calls "intellectualist legend". According to that position, knowing-how can be explained through a chronologically ordered pair of activities: Firstly, a subject thinks of certain "regulative" propositions, rules or criteria for the planned actions; secondly, she puts into practice what these propositions purport. Ryle accuses the intellectualist legend of being caught in the grip of Cartesian Dualism that leads to a misconception of human intelligence. He presents the following two main arguments against this intellectualist approach:

1. It conflicts with the learning and applying situations of knowing-how we are familiar with in everyday life: Knowing rules or criteria for an action does not necessarily lead to successful practice, nor does learning how to do something always presuppose some theoretical knowledge of corresponding rules. Thus, there is a gap between knowing and acting that is left unexplained by the intellectualist (in the following, we will call this gap the "Knowledge-Action-Gap").

2. The intellectualist legend's conception of knowing-how leads to a vicious regress: Since thinking about a proposition is itself an action that can be done more or less intelligently, it corresponds to another knowing-how which, according to the legend, can be explained through a previous thinking about certain "regulative propositions", and so on.

In opposition to the intellectualist legend, Ryle argues for a strict dichotomy between knowing-how and knowing-that.[1] In his view, both have to be regarded as two different, irreducible manifestations of human intelligence: knowledge-that is theoretical knowledge of facts while knowledge-how consists in practical abilities, i.e. "multi-tracked dispositions" allowing a flexible, intelligent behavior acquired by training and experiences.

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[1]In his 1945 paper, Ryle even goes further by arguing that the concept of knowledge-how is logically prior to the concept of knowledge-that (cf. Ryle 1945, 4). We will not discuss this argument since it is not relevant to the question we focus on in this paper.

We will not discuss whether Ryle's arguments against the intellectualist legend are persuasive[2] but let us remark that he was not arguing against an argumentatively strong position. In recent discussion, some authors present more sophisticated intellectualist positions, casting doubt on Ryle's positive characterization of knowing-how. Our aim is to show that this recent criticism discloses that Ryle's distinction is indeterminate since he mixes up two different projects connected to the question of the nature of knowing-how.

5.2 Ryle's Critics

In this section, we will consider the criticism against Ryle's identification of knowing-how with practical abilities. An array of putative counterexamples against this thesis has been developed recently. The first class of these examples is given in order to support the following thesis:

(i) Practical abilities are not *necessary* for knowing-how.

The argument runs like this: In various cases we ascribe knowledge-how to a subject even though she lacks the related ability. Snowdon argues that a cook still knows how to bake a cake even though he is hindered to perform his practical ability because the required sugar isn't handy (cf. Snowdon 2004, 8); Stanley and Williamson claim that a *maestra* who loses her arms in a bad accident (and, consequently, her practical ability to play the piano) can still be credited with the corresponding knowledge-how (cf. Stanley and Williamson 2001, 416). In the first example, the practical ability is hindered by *external circumstances.* Yet, this case doesn't present a persuasive argument against Ryle's position since having a practical ability doesn't imply that one is able to put it into practice wherever and whenever he wants to. Practical abilities are sensitive to environmental condition: I wouldn't lose my ability to ride a bicycle just because there is no bicycle handy.[3] The second example is more challenging: In this case, the practical performance is made impossible due to *internal, bodily conditions.* We can admit to Stanley and Williamson that the *maestra* won't lose all knowledge related to the practice of piano playing just because she is disabled to perform her ability. For reason that she is an expert in her field, we will expect that she is still able to explain how the actions can be well performed, or that she can teach others how to perform

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[2]A more detailed discussion can be found in Stanley and Williamson 2001 and Noë 2005.

[3]Cf. also Noë 2005 who describes practical abilities as "embodied" and "situated".

them and judge whether performances are good or bad, etc. However, it is not clear whether these examples can successfully reject Ryle's thesis. Stanley and Williamson claim that the *maestra*'s knowing-how is independent of her actual ability. Yet, there's obviously a *reference problem*: Do we really mean the same when we ascribe knowing-how to the *maestra* before and after the accident? If we learn to play the piano and become experts after some time, our practical ability is usually attended by the acquirement of an array of different kinds of abilities and knowledge, for example, the ability to read music, the theoretical knowledge of different structures of piano pieces, or the ability to listen carefully to music performed by others. It is unclear whether accrediting the *maestra* with knowledge-how after the accident is just a way to acknowledge these pieces of knowledge and abilities she still possesses even though she has probably lost her knowledge how to play the piano (i.e., her practical skill). What Stanley and Williamson show by citing this example is that in our everyday language the reference of "knowing-how" is underdetermined: We can refer to the practical ability itself but also to another set of knowledge and abilities that is related to this ability. We will discuss this problem in more detail in Section 5.5.1. However, if we just accept that knowing-how, in one of its senses, refers to the practical ability, Ryle's account can successfully be defended against the putative counter-examples.

Another set of examples brought up against Ryle's view is given to support the following thesis:

(ii) Practical abilities are not *sufficient* for knowing-how.

White refers to abilities like hearing traffic, seeing across the room, holding five pints of beer, or doing without sleep for about 18 hours. He argues that all these abilities don't correspond with knowledge-how: we are *simply able* to perform them (cf. White 1982, 16). Snowdon cites the case of Martin who is able to perform fifty consecutive sit-ups arguing that Martin's ability is not related to a specific knowledge-how (cf. Snowdon 2004, 11). Regardless of how persuasive these objections are, Ryle could have answered them by specifying the concept of practical ability he identified with knowing-how. Thus, he could have excluded the cases White cites by considering only abilities sensitive to learning processes. Snowdon's case, in turn, discloses the need for an appropriate *individuation* of practical abilities. We do not ascribe a specific knowing-how to Martin since the ability to do *exactly fifty* consecutive sit-ups is, in general, not of interest. We would rather credit Martin with the ability to do sit ups (and the corresponding knowing-how,

respectively) and emphasize that he is able to perform it with an impressive strength and endurance.

To conclude: The counter-examples show that Ryle's dichotomy needs some specification in order to cope with the reference problem of knowing-how and the under-determination of the concept of a practical ability. Therefore, a naïve identification of knowing-how with abilities might be too strong since the examples suggest that there is no strict synonymy between both concepts.

5.3 Stanley and Williamson's New Intellectualism

A possibility to reject Ryle's account is to argue for a persuasive analysis of knowing-how that successfully reduces it to knowing-that. This is the objective of Stanley and Williamson's (in the following: S&W) approach that has become the anchor-point of recent discussions. Knowing-how is, according to S&W, a species of knowledge-that, in the same way as other knowledge ascription like knowing where, who, why, etc, are kinds of propositional knowledge. In other words, if we ascribe the knowledge-how of, say, riding a bicycle to a subject, we indeed do ascribe knowledge-that to her. To support this claim, S&W analyze knowledge ascriptions in the light of contemporary theories of syntax and semantics. The analysis of their paradigmatic sentence "Hannah knows how to ride a bicycle" leads, according to them, to a "knowing-that"-clause since it is true

> [...] if and only if, for some contextually relevant way w which is a way for Hannah to ride a bicycle, Hannah knows that w is a way for her to ride a bicycle. (Stanley and Williamson 2001, 426)

S&W admit that this characterization of "knowing-how"-ascriptions is not complete. Since we can think of propositions in different ways, the analysis must be extended by clarifying which mode of presentation is connected to relevant instances of knowing-how. Therefore, S&W introduce a new kind of mode of presentation, a so-called "practical mode of presentation" (cf. Stanley and Williamson 2001, 429ff.), in order to do justice to the difference between a knowing how to ride a bicycle that we acquire only through, for example, observing other people riding bikes (and that, therefore, is represented in a demonstrative mode of presentation) and the relevant knowing-how going beyond this. S&W remark that this practical mode of presentation is related in "complex ways to dispositional states" (Stanley and Williamson 2001, 430). A detailed analysis is, according to them, only possible via reference to other modes of presentation: They claim that the use of it can be made intelligible through analogy to the "here"-mode of presentation intro-

duced by Gareth Evans (cf. Evans 1982) and the "first-person"-mode of presentation referred to by John Perry (cf. Perry 1979, for further discussion see Newen 1997) in order to describe different functional roles of mental states within the discussion of indexicality.

We will discuss some problems confronting the "practical mode of presentation" in Section 5.5.1. At the moment our focus is on another question: Do S&W develop an analysis that can reject Ryle's analysis *in general*, i.e., are the conflicting analyses at all comparable? This question concerns the background assumptions and methodologies on which Ryle's and S&W's theories of knowing-how are based on. Let us explain this in more detail. Noë 2005 accuses S&W of deducing their explanation of "knowing-how" from recent linguistic theories about "knowing-how"-sentences. As he puts it:

> Ryle's distinction is not a thesis about the sentences used to attribute propositional and practical knowledge respectively. It is a thesis about the nature of practical and propositional knowledge. (Noë 2005, 287)

Stanley rejects this objection:

> Stanley and Williamson propose a thesis about the nature of knowing-how; they do not only make claims about sentences that ascribe knowledge-how. According to them, all of the reasons that have been given for rejecting propositional knowledge accounts of knowledge how can be accommodated by their view of its fundamental nature. (Stanley forthcoming, 14)

This leads to the following question: What *is* the nature of knowledge-how and what *methods* should we use in order to analyze it? In the following section we will show that Ryle's analysis leaves open this question and that at least two different projects can be identified based on two very different understandings of the nature of knowledge-how.

5.4   Ryle Revisited

On the one hand, Ryle's aim was to explain that our *ordinary notion* of knowing-how cannot be explained in terms of knowing-that: both notions belong, according to him, to different families of expressions. Whereas the former is connected to predicates like "intelligent", "clever", etc., the latter relates to those like "intellectual" or "well informed". Therefore, he seemed indeed to be aiming to provide a semantic analysis of knowledge-how. On the other hand, Ryle's aim was to show that there are two different ways of "exercising qualities of mind" (Ryle 1949, 25). In this way, Ryle's project goes beyond a semantic analysis of the concept of knowing-how. It concerns the question of whether all mental cognitive processes can be analyzed in terms of propositional

knowledge. Ryle's arguments against the intellectualist legend can be interpreted in this spirit: He accuses it of neglecting our everyday experiences concerning learning and applying knowing-how (and abilities, respectively). In other words, he argues that the intellectualist position is at conflict with the mental nature and the phenomenology of practical abilities. We will call the project related to this question the "knowledge representation" project since it concerns the question of how we gain and use information that constitutes knowing-how (in the sense of being able to act intelligently) and knowing-that, respectively.[4]

Now we see why Ryle's account is problematic: His approach to knowing-how and knowing-that crosses two different projects, namely, the "semantic analysis" project, on the one hand, and the "knowledge representation" project, on the other hand. Thus, his account affects both, questions in epistemology (mostly related to project 1) as well as questions in the philosophy of mind and the cognitive sciences (mostly related to project 2). The main aim of this paper is to argue that both projects should be kept apart since in the recent discussion of knowing-how and knowing-that many arguments are due to an illegitimate amalgamation of the two projects.

The same problem holds for the notion of intellectualism that is widely used in philosophy and cognitive science, yet not used consistently: the two different projects we characterized above correspond to at least two different intellectualist positions. Consider how Stanley describes intellectualism:

> Let us call *intellectualism* the view that knowing how to do something is a species of knowing that something is the case. (Chapter 3, 41)

S&W's intellectualism has to be understood in terms of the "semantic analysis" project: They vindicate intellectualism insofar as they hold that our ordinary notion of knowing-how can be exhaustively explained in terms of knowing-that. As Stanley puts it, the main objection to Ryle's account is that "[o]ur ordinary notion [of knowing-how] is not Rylean in character" (Stanley forthcoming, 2). Thus, the first kind of intellectualism can be defined in the following way:

Intellectualism$_1$ The phenomenon we refer to by using the concept of knowing-how can be defined through the phenomenon we refer to by using the concept of knowing-that.

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[4]We do not want to argue for the claim that all questions about knowing-how can be covered by these two projects. There might be various other projects. What we aim to show, in the following, is that the recent debate on knowing-how and knowing-that is predominated by the merging of the two projects we named.

As we have already shown, the second project does not focus on our ordinary or folk-psychological notions of knowing-how and knowing-that but rather on the information processing systems underlying the phenomena usually associated with these notions. Therefore, the second kind of intellectualism can be defined in the following way:

Intellectualism$_2$ Information processes constituting knowing-how (and abilities, respectively)[5] can be reduced to information processes constituting knowing-that (factual knowledge).

In the following section we will discuss the two kinds of intellectualism in more detail.

5.5 Two Kinds of Intellectualism

5.5.1 Intellectualism$_1$: The "Semantic Analysis"-Project

Let us first consider intellectualism$_1$ and the "semantic analysis"-project, respectively. Intellectualism$_1$ is characterized by the thesis that our folk-psychological notion of knowing-how does not refer to a phenomenon irreducible to knowing-that, i.e., propositional knowledge, but can rather be explained in terms of it. This is to say that knowing-how denotes a relation between a subject and a proposition, and not (as Ryle suggests) between a subject and an ability (or anything else that is irreducible to propositional knowledge). We have shown that S&W accuse Ryle's analysis of not appropriately analyzing our everyday notion of knowing-how.

Ryle's "semantic analysis" project can be regarded as a follow-up project of the late Wittgenstein: Based upon the use of our ordinary concepts, he aims at presenting a philosophical account that can explain the mental phenomena (not only our speech of them). According to Ryle, our everyday concept of knowing-how is used in a way guided by an implicit understanding of the underlying phenomena. His aim is to reveal this understanding within a new theoretical framework. S&W's approach is quite different: They regard a paradigmatic sentence we use for ascribing knowledge-how and develop an appropriate linguistic analysis of this sentence based on recent theories of syntax and semantics. The key for supporting a reductive analysis of knowing-how lies, according to them, in the truth conditions of the sentence in question. From a linguistic perspective, S&W hold that (i) Ryle's analysis is wrong since it doesn't fit with the linguistic analysis, and (ii) "knowing-how"-sentences aren't ambiguous since the analysis leads

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[5]Intellectualism within the second projects depends on how knowing-how is defined. Often, but not always, it is identified with practical abilities. See also Section 5.5.2.

unequivocally to an intellectualist claim. Of course, it is one of S&W's merits that they offer a systematic analysis including recent theories of syntax and semantics; Ryle's account misses these systematics and is more or less based on some linguistic intuitions. However, we argue that S&W do not offer a complete solution to the "semantic-analysis"-project.

In Section 5.2 we have shown that a naïve identification of knowledge-how with practical abilities (and of "knowing-how" with "can" or "being able", respectively) is obviously wrong. Thus, there is at least no synonymy between both concepts.[6] Other authors have already acknowledged this deficit in Ryle's account. As Edward Craig puts it: " 'Know how to' is indeed related to 'can', but not so closely as to justify synonymy" (Craig 1990, 155). For this reason, we introduced two different readings of "knowing-how"-sentences (cf. Jung and Newen 2010): a "propositional" reading, on the one hand, and an "ability" reading, on the other hand. This is in line with, for example, Jaakko Hintikka's distinction of the "knowing the way" sense and the "skill" sense of knowing-how:

> What is confusing about the locution 'knowing how' is that it has several different uses. On one hand, [...] "a knows how to do x" may mean that a has the skill and capacities required to do x, it may also mean that a knows the answer to the question: How should one go about it in order to do x? (Hintikka 1975, 11)

Thus, we are confronted with the following problem: Our folk-psychological notion of "knowing-how" does not refer to a single phenomenon. In this sense, Ryle's account seems to be compatible with Stanley and Williamson's since both do describe different senses of "knowing-how": the former the "ability", or "skill" sense, the latter the "propositional", or "knowing the way" sense. Yet, S&W are not convinced by this: They hold that the semantic analysis of "knowing-how"-ascriptions leads unequivocally to ascriptions of propositional knowledge (i.e., knowing-that) denying that the "ability" sense has any impact on the semantic project. In the following, we will argue that this is not a promising strategy.

The question is how the two senses of "knowing-how" are related to each other. Hintikka argues in the following way:

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[6]However, we do not agree with Ryle's critics that he intended to defend this strong synonymy since he tried to specify what kinds of abilities are related to "knowing-how". According to Ryle only abilities that become manifest by "acquired, multi-tracked dispositions" (cf. Ryle 1949, 40ff.) count as knowledge-how. Thus, it is required that we can learn those abilities (vs. innate abilities) and that we have minimal control in exercising them (vs. mere habits).

> Of these, the skill sense seems to be largely parasitic on the other one. Its presence in ordinary discourse can be partly explained in terms of pragmatic (conversational) forces. (Hintikka 1975, 11)

This suggests that there is indeed no strict linguistic ambiguity of "knowing-how"-sentence. We can admit to S&W that the "propositional" sense has some priority over the "ability" sense. Moreover, it has many advantages to identify knowing-how as a species of knowing-that. Understood in this way it shows some core similarities to other kinds of propositional knowledge and can be related to traditional epistemic concepts like truth, belief, and justification. This allows for an integration of knowing-how into our traditional epistemological projects.[7] But can the "ability", or "skill" sense simply be neglected? As Hintikka puts it, it may at least count as an "unavoidable shadow of the 'knowing the way' sense." (Hintikka 1975, 12). A way to reject S&W would be to doubt that their semantic analysis is correct and that the skill-sense must indeed be included to it. In this line, Ian Rumfitt 2003 objects that S&W's linguistic argument doesn't succeed if it is formulated in several natural languages other than English. Stanley tries to respond to this objection by citing an array of paradigmatic cases from various languages (cf. Stanley forthcoming, sec. 5). Still, it is an open question whether S&W's account can be defended against this cross-linguistic argument. However, S&W's view seems to be supported by recent studies in experimental philosophy: Bengson et al. 2009 have provided a series of studies in which people were presented by several stories corresponding to the examples brought up in the debate and had to judge whether the subjects in question are able to perform an action, or know how to perform an action. They conclude that the folk-psychological notion of knowing-how is intellectualist rather than Rylean and doesn't show any ambiguity. Yet, it is difficult to interpret the results of those empirical studies: The situations described in those experiments are quite artificial. The participants were not free to judge the situations by their own words, but rather had to do a multiple-choice test that already suggested a difference in meaning of "knowing-how" and "ability". Therefore, the studies cannot be treated as strong evidence for intellectualism$_1$.

Our aim is to criticize S&W's account from a different point of view: We claim that their analysis of knowing-how does itself include pragmatics and therefore doubts the basis for neglecting the pragmatic

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[7]Some authors have argued, however, that knowing-how understood in S&W's way differs from other forms of propositional knowledge. Poston 2009, e.g., doubts that it can be subject to Gettier-cases. We will not focus on this discussion here since our argument doesn't rely on this.

"skill" sense of the semantic analysis project. Let us explain this in more detail.

S&W's approach is confronted with a severe problem: Since they do not specify how a "practical mode of presentation" can be understood, it remains dubious whether they *de facto* present an argument for a complete reduction of knowing-how to knowing-that. Stanley tries to specify what is meant by "entertaining a practical mode of presentation" by saying:

> I only think of a way of doing something under a practical mode of presentation if I am disposed to employ it under various counterfactual circumstances. I may think of the very same way under a demonstrative mode of presentation, without having such dispositions. Of course, it is no easier to say what these dispositions are in the case of practical modes of presentation than in the case of "here" thought or "I" thoughts. But it is also no harder. (Stanley forthcoming, 6)

However, in case of spatial and indexical knowledge, the "here"- and the "first-person"-mode of presentation are related to certain *objects* (places and persons) whereas the practical mode of presentation is used to describe different *relations to facts*. Yet, it is unclear how these facts, in the case of practical abilities, can be individuated: It is hard to identify the propositions Hannah should know in order to be credited with relevant knowing-how. S&W presuppose that our knowledge how to ride a bicycle refers to the same ways of acting in case of merely regarding a person riding a bike (demonstrative mode of presentation) and in the more practical sense of "real" knowing-how (practical mode of presentation). And exactly this presupposition is questionable. As Jennifer Hornsby puts it:

> The problem is that the account requires identities between demonstrable ways of ϕ-ing (on the one hand) and such ways of ϕ-ing as go hand in hand with knowing how to ϕ (on the other hand); and there are not such identities. (Hornsby 2007, 179)

The problem lies in the facts or propositions that S&W assume to constitute cases of knowing-how. Stanley denies that propositional knowledge is bound to the verbal ability to express the constituents of the proposition grasped, *a fortiori* the proposition itself. As an example for a case of "grasping a proposition" not meeting this condition of verbal expressibility he cites the following case:

> The 8 year old Mozart can assert the proposition that constitutes his knowledge how to compose a symphony; he can just say, while composing it, the German translation of "this is how I can do it". (Stanley forthcoming, 8)

What can be deduced from this example? If we do ascribe propositional knowledge to little Mozart, our analysis of knowledge-how includes pragmatics in the sense of practical application and ability. And this indeed is what S&W want to avoid. Thus, the problem with S&W's analysis lies in the transformation of "knowing-how"-sentences to "knowing the way"-sentences: the knowing-how S&W analyze indeed differs from other propositional knowledge for which the object of knowledge can easily be identified. Even though, as S&W suggest, the possession of knowing-how enables Mozart to answer a question, his answer differs from the answer he would give if we ask him, for example, "What is the capital of France?". Thus, a deeper understanding of what is involved in the "propositional", or "knowing the way" sense may involve some degrees of pragmatism and, therefore, undermines S&W's strategy.[8]

To sum up: Referring to ways for acting under a practical mode of presentation seems to be incompatible with a purely semantic analysis of knowing-how utterances as long as the practical mode of presentation is characterized by dispositions. Since S&W's account of a practical mode of presentation is essentially relying on pragmatic considerations including an introduction of dispositions, there does not remain any convincing argument for neglecting the "ability", or "skill"-sense of knowing-how. In Section 5.6 we will suggest that the "semantic analysis"-project leads us to two different notions of knowledge even though these notions do not parallel the notions of knowing-how and knowing-that: We have seen that the former notion cannot be characterized fruitfully by a single analysis since two senses are applicable to it.

5.5.2 Intellectualism$_2$: The "Knowledge Representation"-Project

The core question of the second project is: How does the mind work? How do we represent knowledge? Many empirical sciences are concerned with this question. So, there's no wonder why Ryle's dichotomy of knowing-how and knowing-that has been used for a long time in cognitive sciences, philosophy of mind, psychology, and neurosciences. It goes along with several other dichotomies as procedural and declarative knowledge and memory, explicit and implicit knowledge and memory as well as implicit and explicit learning. Yet, these notions are neither strongly parallel nor defined uniquely in the literature.[9] Thus, if we are concerned with the second project, we have to be careful to judge

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[8]For a similar objection against S&W see Stout 2010.

[9]For an overview of the various definitions see Eysenck et al. 1994, especially page 93, and Anderson 1980.

intellectualist positions: It is often not clear which distinction is indeed rejected. We will not discuss this problem in detail.

For the sake of argument, we only want to emphasize one point: Some authors (cf. Adams 2009) suggest that S&W's approach can be refuted since the differentiation of two different information processing systems in the brain is empirically grounded. However, we have seen that this is not a legitimate argument against S&W's theory since it crisscrosses the two different projects that are orthogonal to each other. In the following, we will focus on intellectualism$_2$ more directly by discussing two seminal positions: Fodor's 1968 account and the more recent theory of Dienes and Perner 1999.

In his 1968 article *The Appeal to Tacit Knowledge in Psychological Explanation* Fodor focuses on the paradigmatic example of the ability to tie one's shoes. His starting point is a homunculi explanation of the functions underlying this capacity: One should imagine that a little man lives in the head keeping a library that entails a volume on the method of "tying ones shoes". The little man presses buttons that activate mechanisms implying behavioral patterns. This model is intellectualist because it describes a way in which the performance of successful action can be reduced to the knowledge of rules guiding the successful action of shoe-binding. Fodor tries to defend such "intellectualist accounts of mental competences" (Fodor 1968, 627). He regards some objections that can be made against those models and tries to reject them:

(1) The objection that the model doesn't explain the details adequately concerns, according to Fodor, an empirical question and can't be seen as an objection to the model *in general*: If the detailed and complex mechanisms of tying one's shoes are known, then it remains the questions of whether the model gives an adequate description of the representations in mind when tying one's shoes. The question is, therefore, whether the model is *methodologically* wrong.

(2) The objection that the model leads to a vicious regress on the bases that the little man always has to know how to apply the rules he regards as important for the successful performance can also be rejected: There are things that we can simply do, i.e., *elementary operations* not depending on rules. These operations avoid the threatened regress.

(3) The objection that the model is inadequate because we usually cannot explain the rules underlying our intelligent actions like tying our shoes is rejected by Fodor through reference to the existence of "tacit knowledge", a technical term used in psychology. This notion plays a central role for his reductive analysis of the performance of abilities to propositional knowledge. As he puts it:

> The problem can be put in the following way. Intellectualists want to argue that cases of X-ing involve employing rules, the explication of which is tantamount to a specification of how to X. However, they want to deny that anyone who employs such rules, *ipso facto*, knows the answer to the question "How does one X?" What, then, *are* we to say is the epistemic relation an agent necessarily bears to rules he regularly employs in the integration of behavior? There is a classical intellectualist suggestion: If an agent regularly employs rules in the integration of behavior, then if the agent is unable to report these rules, then it is necessarily true that the agent has *tacit* knowledge of them. (Fodor 1968, 636)

And later on:

> Now I want to say: If X is something an organism knows how to do but is unable to explain how to do, and if S is some sequence of operations, the specification of which would constitute an answer to the question "How do you X?", and if an optimal simulation of the behavior of the organism X-s by running through the sequence of operations specified by S, then the organism *tacitly knows* the answer to the question "How do you X?" and S is a formulation of the organism's tacit knowledge. (Fodor 1968, 638)

The line of argument is quite clear: Through an inference from the operations underlying a successful simulation of our behavior Fodor holds that our ability to tie our shoes can be reduced to propositional knowledge even though the knowledge of the operation remains tacitly (implicitly) represented.

However, Fodor's approach is problematic for two main reasons: Firstly, his inference from processes underlying a machine's performance to the processes of the mind is not justified. Why should the mind work in exactly the same way as the simulator only because it leads to the same behavioral output? And secondly, his account does not explain the "Knowledge-Action-Gap" Ryle was hinting at. The assumption of "tacit knowledge" seems to be an *ad-hoc* hypothesis rather than an appropriate explanation of the ongoing processes that guide our intelligent behavior.

Another more recent intellectualist theory of knowledge-how is presented by Zoltan Dienes and Josef Perner 1999 (in the following: D&P). They develop a fine grained representational theory of knowledge according to which the two forms of knowledge can best be explained through implicitly and explicitly represented aspects of propositional knowledge. D&P suggest the source for implicitness lies in the fact that the information conveyed implicitly concerns supporting facts that are

necessary for the explicit part to have the meaning it has. They define implicit and explicit representations in the following way:

> In our analysis the distinction is between which parts of the knowledge are explicitly represented and which parts are implicit in either the functional role or the conceptual structure of the explicit representations. A fact is explicitly represented if there is an expression (mental or otherwise) whose meaning is just that fact; in other words, if there is an internal state whose function is to indicate that fact. Supporting facts that are not explicitly represented but must hold for the explicitly known fact to be known are *implicitly represented*. (Dienes and Perner 1999, 736)

Thus, D&P's analysis is based on Fodor's Representational Theory of the Mind (in the following: RTM). They suggest that we should think of knowledge as a propositional attitude. According to this theory representations like "This is a cat" constitute knowledge if they are stored in a so-called "knowledge-box". Thus, their functional role lies in a reflection of a state of the world (in comparison to desired states that are thought of to be stored in a "goal box"). D&P first regard a coarse-grained distinction between self (holder of the attitude), the attitude ("knowing") and the content ("what is known"). They go on with more fine-grained distinctions concerning these parts in order to develop a hierarchical model allowing for a scale of more or less explicitly represented knowledge. Their paradigm case is visually guided knowledge, namely the perceptual knowledge of a cat sitting in front of the knowing subject. At the first end of the scale there is knowledge were only one part of the content, namely the property (e.g., "being a cat") is explicitly represented whereas all the other components remain implicit. This is the case when subjects are only able to name a presented object ("cat") but do not explicitly know any other part of the knowledge-relational components. At the other end of the scale is "fully" explicit knowledge that is marked through an explicit representation of all the parts they describe. In this case, not only does the subject fully and explicitly represent all parts of the content known but also has explicit knowledge about her attitude (knowing) and is aware of herself as the holder of this attitude.

However, also D&P's account is confronted with several problems. Ingar Brinck 1999, for example, objects that the model may describe visually guided knowledge adequately, but that it doesn't allow for an explanation of *practical competences*. Those competences are usually based on what is called "nonconceptual representations" that cannot be described as constitutents of propositional beliefs. Moreover, those nonconceptual representations are related to "correctness con-

ditions" rather than to "truth condition" as D&P suggest (cf. Brinck 1999, 760-1). The authors answer to this objection by claiming that all characteristics that are usually ascribed to nonconceptual representations can be ascribed to the partially known content in case of implicit knowledge within their model (cf. Dienes and Perner 1999, 792). This might be true. In this case, however, the model D&P present doesn't seem to be a clear intellectualist model of knowledge representation any more. Rather, it tries to integrate anti-intellectualist tendencies. But this seems to be very misleading: Since they use RTM as a background assumption for their account (and this theory is, by definition, an intellectualist theory), they seem to present an anti-intellectualist model that is captured by intellectualist termini. Let us explain this a little bit more in detail: The suggestion that all the forms of implicit and explicit knowledge D&P describe can be explained on the basis of RTM suggests that these forms of knowledge are based on the very same representational format. And this assumption is usually seen as the core question in the conflict between anti-intellectualists and intellectualists. Holding that their theory allows for other representational formats (nonconceptual contents), too, undermines the strategy they use: why should we characterize nonconceptual representations as implicit conceptual components? In this case, RTM seems just to be a background theory that presupposes only one structure of knowledge (a propositional structure) but remains explanatory unfruitful and misleading. It is only a way to ascribe all forms of knowledge from an outside-perspective and judges what components remain implicitly represented by classifying the behavior of the subject in question. It remains unexplained how the implicit components are connected with our practical abilities. Therefore, D&P are also not able to bridge the "Knowledge-Action-Gap".

To conclude: Neither Fodor's description of practical knowledge based on the Language of Thought-Hypothesis nor D&Ps more fine-grained theory relying on RTM offer a fruitful analysis since they fail in bridging the "Knowledge-Action-Gap". Thus, intellectualism$_2$ loses its attraction: The need for other representational formats than language-like representations becomes obvious. In Section 5.7 we will present a threefold approach to knowledge formats that avoids some of the problems intellectualist theories are confronted with.

5.6   Two Notions of Knowledge

In this section, we will focus on the semantic analysis project and develop a dichotomy of theoretical and practical knowledge that catches some of Ryle's core intuitions although not conforming to his approach.

We suggest differing between theoretical and practical knowledge in the following way: Theoretical knowledge, the most important form of knowledge in epistemology, describes a relation between a subject and a proposition thereby being related to a *norm of truth*. It is a focus of the "justified-true-belief"-analysis and of traditional epistemological questions, for example, the question what does count as reliable justification of our beliefs to be classified as knowledge. Practical knowledge, instead, describes a relation between a subject and an activity. This knowledge is related to the norm of success: We ascribe some ability to a person if she is able to successfully perform it.

Note that the two notions of knowledge essentially differ: Whereas the notion of theoretical knowledge denotes a "mind-to-world" direction of fit, the notion of practical knowledge is related to a "world-to-mind" direction of fit. Moreover, it is misleading to identify an object of knowledge in the case of practical knowledge: There simply is not such an object since it denotes a very different structure. It doesn't refer to an adequate thinking or believing about the world, but rather to successfully performed intentional actions.

Beyond these differences, there are also many similarities between the two notions: We have seen that the naïve identification of practical knowledge with abilities doesn't account for our intuitions. In most of the cases, we demand more than successful action; we expect the subject to perform the action in question in various circumstances. Katherine Hawley 2003 has addressed this problem by proposing an account of "knowing-how" (in our terms: of practical knowledge) as successful action plus warrant. To specify how this warrant is understood she offers a counterfactual analysis that is similar to Robert Nozick's 1981 counterfactual analysis of theoretical knowledge. A similar claim is made by Peter Markie 2006 who emphasizes the need for a justification or reliability of practical knowledge:

> To know how to engage in an activity is to internalize some norms directing the performance of particular ways of acting in various circumstances in order to engage in the activity, where those ways of acting in those circumstances are, in fact, reliable ways of engaging in the activity. (Markie 2006, 22)

Another problem concerning the analysis of practical knowledge concerns the activities that are correlated with practical knowledge. We do not assume that the performance of each and any activity counts as practical knowledge, but rather demand that the activities have to be performed intentionally and can be minimally controlled by the subject. Patricia Hanna 2006 addresses this problem and distinguishes be-

tween random or non-purposive activities that do not correspond to any knowledge, skills which we know how to perform, and "reasoned skills" for which rules play a special role. Those skills are, according to her, only successfully performable in case we consciously know the corresponding rules, i.e., in case we indeed have theoretical knowledge about them.

To avoid any misunderstandings: Our aim is not only to criticize intellectualism about knowing-how and knowing-that, but also to provide a new starting point for tackling the problem Ryle had in mind. We think that defining practical and theoretical knowledge in the way we suggest offers an alternative to the mere confrontation of intellectualism and anti-intellectualism.

5.7   Knowledge Formats – a Threefold Approach

In this section, we will focus on the second project—the knowledge representation project. We have seen that intellectualism$_2$ is not convincing since it doesn't do justice to our questions concerning how we extract and represent information from the environment that enable us to successfully perform actions. We propose a threefold analysis distinguishing (1) a propositional knowledge format, (2) a nonconceptual sensorimotor knowledge format, and (3) an image-like knowledge format. We try to support our threefold theory of knowledge formats by arguing for specific representations that are systematically distinguishable: (i) propositional representations, (ii) sensorimotor representations and (iii) image-like representations. We start with an unproblematic characterization of propositional representations. In a second step we illustrate all three kinds of representations presenting paradigmatic examples and argue that those representations are mutually different.

Propositional representations can be identified with linguistic or language-like representations (see, for example, Peacocke 1992). A mental representation is propositional if and only if the representation has an internal structure like a natural language. This involves the central features of a natural language (cf. Fodor 1998) including compositionality, systematicity, productivity, a strong stimulus independence as well as inferential relations. There is broad consensus that propositional representations have to be characterized in that way.

However, during the last decades the assumptions that all representations are structured by the Language of Thought has become under attack. The insight that there is intelligent behavior that can't be explained as being based on propositional representations has led to the

assumption of nonconceptual representations.[10] Even though those representations allow for a minimal flexible behavior they are essentially stimuli dependent. The differentiation between propositional and nonconceptual, sensorimotor representations in humans has been demonstrated for visual knowledge on the basis of Milner and Goodale's 1993 so-called two visual system hypothesis.[11]

Also in representations of actions which are the main focus of our paper the role of nonconceptual content has been emphasized recently. Jeannerod 1997, for example, assumes that our actions are initiated by nonconceptually, "pragmatically" represented goals of action. Moreover, the guidance of our actions relies on sensorimotor representations that have as their content the movements of our body from the starting to the intended state and allow for smooth and precise executions. In general, sensorimotor representations include the information that is provided by what Gibson 1979 called "affordances", i.e., qualities of the environment that allow subjects to perform certain actions. Affordances ascribe a close relationship between perceptions and actions: By perceiving the affordance properties of graspability and drinkability a subject might reach out for the glass of water when she is thirsty.[12] Since sensorimotor representations are usually unconscious they enable us to smoothly interact with the environment in order to achieve our ends.

We think that to emphasize the role of nonconceptual representations for action is a good starting point to bridge the "Knowledge-Action-Gap". However, the distinction between propositional and nonconceptual representations is too coarse-grained to capture all cognitive processes bound to our abilities. Therefore, it is necessary to introduce a third representational format: *image-like* representations. This assumption is mirrored by Jeannerod's 1997 notion of "motor images" that describe a conscious access to usually unconsciously represented motor-patterns.

How can we characterize image-like representations in more detail? In basic actions like walking, grasping an object etc. we seem to rely simply on basic sensorimotor representations which are only activated if we receive an actual perceptual input as key stimulus. The key stimulus, for example, seeing a glass of water, may be the stimulus to grasp it given the situation of being thirsty. Sensorimotor representations differ

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[10]See, for example, the discussion of the homing behavior of ants that supports the explanatory force of nonconceptual representations (Müller and Wehner 1988; Gunther 2003; Newen and Bartels 2007).

[11]See, for example, Young's discussion of patient DF in Chapter 4 of this volume.

[12]For a more detailed discussion of affordances see Chapter 4 of this volume.

from the image-like representations which we need to realize complex motor skills. Before presenting some examples let us highlight the distinguishing features: The claim is that we have to presuppose image-like representations (1) that are systematically connected with perceptual images and sensorimotor representations (as opposed to linguistic symbols which can be completely independent from any imagination), (2) that can nevertheless be activated independent from key-stimuli, for example, we can activate these representations by imagination (not only by actual perception), (3) that are forming an analog pattern, (4) that can be connected with other image-like patterns (connectability). Criterion 4 accounts for two cases: (a) image-like representations can be connected with sensorimotor representations, to perform an intended action which the subject wasn't able to perform without this new representational unity (see discussion of rotation ability below), (b) image-like representations can be connected with other image-like representations to form a new complex image, i.e., that allows the subject to imagine an action she never has performed before (see discussion of the tennis-example below).

There are several phenomena we can only account for if we presuppose image-like representations that are, on the one hand, non-propositional but, on the other hand, clearly different from basic non-conceptual sensorimotor representations depending on actual perceptual inputs. In a study of motor skills, Franz Mechsner et al. 2001 asked participants to rotate with both hands on a special apparatus (see Figure 1 on the facing page). If being asked to rotate with both hands in a parallel synchronous circling pattern (0 degree difference) or in an antiphase pattern (180 degree difference), they could easily realize the tasks by relying on image-like representations of the intended rotation-schema. Mechsner introduced two flags on top of each side of the rotation equipment that allow us to visually control the parallel or the antiphase rotation.

If being asked to rotate both hands such that one performs four circles with the left hand while one has to perform only three circles with the right hand at the same time, the participants were not able to do that. They simply did not have the image-like representation required. Mechsner then connected the flags above the left crank with the flag above the right hand (due to a gear system) such that, if the participants performed the 4 to 3 rotation with their hands, then the flags were rotating with the same frequency. In this case they could activate the image-like representation of such isofrequent flags again (which was already used before) and quickly learned to rotate in a 4 to 3 relation which had been impossible without this change of equipment.
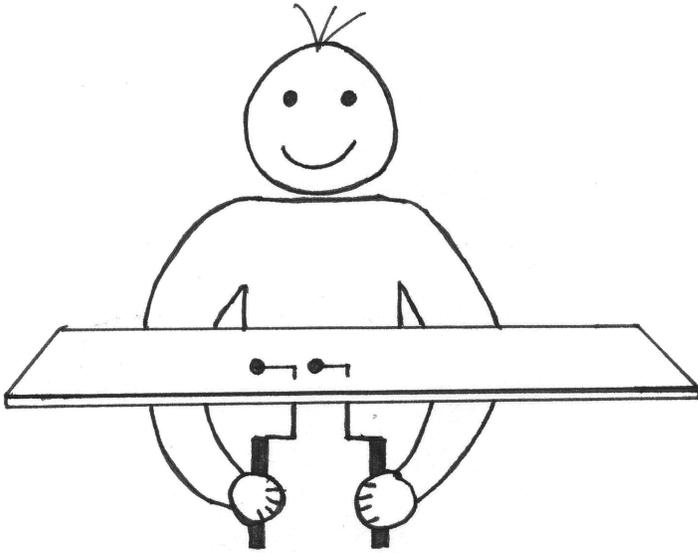
FIGURE 1 Experimental set-up of motor-skill study
by Mechsner et al. 2001.

The important lesson here is that we need an image of the rotation schema to realize the complex movement.

A second study supports the claim that the representations which allow us to realize complex motor behavior actually fulfill the criteria of image-like representations. One activity which is carefully studied is playing tennis (Schack and Mechsner 2006). The authors argue that complex motor activities like playing tennis are essentially relying on a special type of perceptual-cognitive representation which they call basic action concepts (BACs).[13] Basic action concepts like throwing a ball, bending the knee, bending the elbow, turning one's body, racket acceleration, stretching the whole body, etc. (11 BACs are identified with tennis) are organized and stored in memory as perceptual events (cf. Schack and Mechsner 2006, 77). This immediately shows that the

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[13] According to our understanding these representations remain nonconceptual because they are not interdependent in a minimal holistic network although they are used to build connections (minimal connectability). The role of minimal holism as a necessary condition for a theory of concept possession is developed and defended in Newen and Bartels 2007. For the discussion here is sufficient to show that these representations are nonpropositional on the one hand but nevertheless distinguishable from basic sensorimotor representations.

first two criteria for image-like representations are satisfied: These representations are connected with images and are independent from actual perceptual inputs because they are stored in long-term memory and can be activated in quite different situations. Let us have a look at criteria 3 and 4: Given that, typically, we have pictorial representations these representations remain analog although they reach some level of abstractness. The information is analog because it contains a lot of gradually represented information, for example the velocity and direction of throwing the ball is not represented in a digital format. A digital representation focuses on one feature of an entity (including processes) and classifies that feature into one clear subcategory of several subcategories relative to one dimension (for example, the ball was hit soft, medium or hard). The image-like representations remain analog by relying on the gradual representation of the force, velocity etc. Finally, these basic action concepts can be connected to represent an integrated, more complex behavior, for example, 11 BACs form the units that can be combined to represent an activity like hitting a serve or returning a ball using a backhand grip. The connectability of BACs differs from the compositionality and systematicity of linguistic concepts. BACs only allow for extremely constraint connections and remain dependent on the activation of the relevant images. The characteristic independence of linguistic symbols from any kind of perceptual input and perceptual images is not realized on this level. On the other hand, the level of abstractness is already independent from actual perceptual inputs; that is the characteristic feature of basic sensorimotor representations.[14] Therefore, the representations involved in playing tennis are image-like representations which constitute a third independent level of representational format for abilities.

Image-like representations allow for mental training which is an important part of preparation in high-level sports performances. And it now becomes clear why this is possible. The image-like representations

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[14]We do nor claim that sensorimotor representations aren't connected with perceptions at all; they are basically connected with situation-dependent actual perceptual inputs while image-like representations are essentially constituted by memory-based representations of images (in one of the sensory modalities) which can be activated independently from a key-stimulus and from any specific actual perceptual input. Furthermore, the study of Schack and Mechsner 2006 shows that experts usually develop a fine-grained cognitive structure of BACs with an hierarchical organization that fits the functional structure of the ability of playing tennis. The non-players had a comparably poor structure and their representations remained much more situation-dependent. Although Schack and Mechsner tend to speak only of one representational format of actions, we think that the strong differences between non-players and players supports our theoretical perspective. They simply ignore the important aspect of situation-dependence versus independence.

are connected with mental images. They can be activated independently from an actual performance situation such that a sports person can start optimizing the mental representations that guide the performance. Let us switch to some support from the area of music: It is shown by Zatorre et al. 1996 & 2005 that in cases of imaging music we can observe an activation of the auditory cortex that is very similar to the activation in the situation of actual listening to music. Furthermore, in the 2005 article the authors report from mental training of musical instruments and the effect that the musicians can "hear" their instrument during these mental trainings. There are further effects of musical imagination described by Sacks 2007: Beethoven was only able to continue composing after suffering from complete deafness because he has developed a very intense musical imagination which we would characterize as a paradigmatic case of image-like representations (Sacks 2007, ch. 4). Image-like representations seem also to be the relevant basis for phantom imaginations in the case of lost body parts: The well-known case of Paul Wittgenstein (a brother of famous Ludwig), a pianist who lost his right arm during the First World War, mirrors this. Wittgenstein was nevertheless able to imagine how to perform a new piece with his right hand long after the accident happened. He developed image-like representations allowing him to work out perfectly the relevant *Fingersatz* for the right hand (Sacks 2007, ch. 21).[15]

To summarize these evidences: It seems necessary to presuppose image-like representations which are still analog but independent from actual sensory inputs while not fulfilling the criteria of propositional representations (systematicity, productivity, compositionality). Especially mental training is presupposing these image-like representations.

5.8 The Specification of Action

In this section, we will show how Pacherie's 2008 recent approach to the phenomenology of action conforms with our threefold analysis of knowledge formats. We take this to be an additional support for our new framework since practical knowledge and the nature and phenomenology of intentional actions are closely interconnected. Pacherie develops a new conceptual framework allowing for a more precise characterization of the many facets of the phenomenology of action by expanding the two-fold theories suggested by, for example, Searle's 1983 distinction between prior intentions and intentions-in-action, and Mele's 1992 distinction between distal and proximal intentions, into a three-fold

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[15]Note that phantom imagination differs from mere phantom pain since they are related to images of actions once performed with the phantom limb.

theory of intentions. She argues for a distinction between three main stages in the process of action specification, each corresponding to a different level of intention (i.e., distal, proximal, and motor intentions) and each level of intention having a distinctive role to play in the guidance and monitoring of the action.

According to Pacherie, the first step of action specification can be characterized by distal intentions (D-intentions) their main function is the rational guidance of our actions, i.e. they terminate practical reasoning about the aim of our action and about the appropriate means and plans to achieve this aim, and they coordinate intra- and interpersonal levels. Since the content of those intentions is conceptual and at least partly describable we can relate it to our network of intentions, beliefs, and desires. Although not completely context-free the forming of D-intentions doesn't strongly depend on the particular situations of the agents. However, this means that the initial description of the intended type of action is very coarse-grained and leaves indeterminate many aspects of the action by not including all the aspects of the situation at hand.

The second step can be characterized through proximal intentions (P-intentions) which are concerned with the generation of an intention to start acting at a given time and situation. Their main function is to anchor our rational action plan in the particular situation of action. Pacherie claims that P-intentions involve an integration of perceptual and conceptual information, i.e., the agent must generate an indexical representation of the action to be performed and be sure that the implementation of the action conforms to the rationally chosen action plan.

Finally, the third step is characterized by motor intentions (M-intentions) that are responsible for the precision and smoothness of the execution of the intended action. Their function is the choice of an appropriate motor pattern and to globally organize the movements by reacting to affordances. The content of those intentions is not consciously accessible.

This threefold description of intentions is in line with our threefold analysis of knowledge-formats: Obviously, D-intentions rely on the propositional, M-intentions on the nonconceptual sensorimotor format. Moreover, the intermediate P-intentions show the explanatory force of our third, i.e. the image-like knowledge format. It can't be assimilated to the abstract, propositional format since it is more fine-grained and relates to the particularities of our acting situations. However, it can't be reduced to the nonconceptual sensorimotor knowledge format either

since it is consciously accessible and operating at a higher degree of abstraction.

In the same way as the reference to P-intentions is necessary to appropriately describe how we implement our rational intentions into a particular acting situation, the image-like knowledge format is necessary to bridge the gap between theoretical knowledge about our action, i.e. the explicit knowledge of the rules and criteria that guide of actions, to the practical knowledge, i.e. the successful performance of our intended actions.

5.9 Conclusion

We have argued that Ryle's approach to knowing-how and knowing-that crosses two different projects: the "semantic analysis" project, on the one hand, the "knowledge representation" projects. On the basis of this distinction we have characterized two kinds of intellectualism and shown that both show some severe problems: Whereas the first kind of intellectualism illegitimately neglects the pragmatics of our language use, the second one is not able to bridge the "Knowledge-Action-Gap". We have proposed a new framework by distinguishing two forms of knowledge (theoretical and practical) and three kinds of knowledge formats (propositional, nonconceptual sensorimotor, image-like).

We think that the discussion about knowing-how and knowing-that Ryle initiated should not be reduced to the conflict between intellectualism and anti-intellectualism since this discussion often relies on misunderstandings. Instead we should focus on some important questions Ryle raised, for example, how can we explain our ability to ride a bicycle? And how is our practical knowledge related to the things we know theoretically concerning riding a bike? We suggested a new conceptual framework that offers a starting point for convincing answers to these questions that touch on topics from various different disciplines as epistemology, philosophy of mind and action as well as the cognitive and neurosciences.

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