The Semantic Reading of Propositionality and Its Relation to Cognitive-Representational Explanations

A Commentary on Andreas Bartels & Mark May

Ramiro Glauer

Bartels and May propose an explanation of the difference between practical and theoretical knowledge in terms of the involvement of non-conceptual and conceptual representations, respectively. They thereby want to alleviate a shortcoming of Stanley's intellectualist theory of knowledge-how that cannot explain this difference. In this paper it is argued that an appreciation of the fact that both Stanley and Bartels and May employ a semantic reading of propositionality makes clear that their endeavors follow quite different goals. While Stanley gives an analysis of how we talk about knowledge-how, Bartels and May are interested in underlying cognitive representations. From Stanley's analysis of knowledge-how, nothing can be inferred about cognitive representations. The semantic reading of propositionality is then spelled out with the help of the idea that ascriptions of propositional attitudes are (like) measurement statements. Some considerations from measurement theory show how propositions can be used to reason about psychological states without themselves having to play any role in a person's psychology.

Keywords
Anti-intellectualism | Concepts | Conceptual representations | Homomorphic mapping | Intellectualism | Knowledge-how | Measurement | Measurement theory | Measurement view | Mental representation | Non-conceptual representations | Personal level | Propositional attitudes | Propositionality | Propositions | Semantic reading of propositionality

Commentator

Ramiro Glauer
ramiro.glauer@ovgu.de
Otto-von-Guericke-Universität
Magdeburg, Germany

Target Authors

Andreas Bartels
andreas.bartels@uni-bonn.de
Rheinische Friedrich-Wilhelms-Universität
Bonn, Germany

Mark May
mm@hsu-hh.de
Helmut-Schmidt-Universität
Hamburg, Germany

1 Introduction

Bartels and May's paper presents the outlines of a theory of practical knowledge. The paper consists of a discussion of intellectualist and anti-intellectualist approaches to knowledge-how, a characterization of a range of behavioral particularities of practical knowledge, and the outlines of a theory that attempts to explain these behavioral particularities in terms of involved underlying mental representations. The discussion is remarkably clear, and the explicit exposition of what is to be explained by a theory of practical knowledge is a great virtue of the paper. For our purposes here, a discussion of the initial characterization of practical knowledge and its attempted explanation in terms of conceptual and non-conceptual capacities would help us assess the import of this paper. To my valuation, however, the discussion also reveals some very important features of the relation between knowledge ascriptions (and, to that effect, ascriptions of propositional attitudes in general) and descriptions of underlying cognitive structures and representations. Most importantly, Bartels and May employ Stanley's semantic reading of propositionality, according to which the propositionality of some mental state depends on whether a proposition is mentioned in the ascription of that state. As a result, questions concerning cognitive structure and underlying representations are largely detached from considerations concerning ascriptions of propositional attitudes. I think this is a great advantage, because we are not led to read back the relational grammatical structure of ascriptions of propositional attitudes onto psychological states themselves. Here I want to focus on this semantic reading of propositionality and ask about its effects on the relation between Bartels and May's proposed explanation of practical knowledge and Stanley's theory of knowledge-how. The result will be that Stanley and Bartels and May attempt to explain quite different things. While Stanley proposes a theory of how we ascribe knowledge-how to each other, Bartels and May are interested in underlying cognitive processes. The semantic reading of propositionality, however, only goes halfway towards disentangling these different endeavors. A further step can be made with the help of the idea that ascriptions of propositional attitudes are (like) measurements. I will call this the *measurement view* of ascriptions of propositional attitudes. Considerations from measurement theory can then be used to shed further light on the relation between ascriptions of propositional attitudes and the underlying cognitive representations. The result will be that nothing can be inferred about cognitive structure from the structure of ascriptions of propositional attitudes alone. Propositions need not play any role in a theory of cognition. Nonetheless, there is a clear sense in which propositional attitudes are real. They are the measurement-theoretic representatives of behaviorally relevant states. In closing I will note that, given the close connection between concepts and propositions, a semantic reading of conceptuality might be desirable. For Bartels and May, this would mean that the difference between practical and theoretical knowledge should not depend on the conceptuality of the underlying representations. But given their definition of conceptuality, this would merely require a change in nomenclature.

Before going into the discussion of a semantic reading of propositionality, of measurement and its bearing on the relation between Bartels and May's proposed explanation of practical knowledge and Stanley's theory of knowledge-how, I will briefly summarize Bartels and May's line of argument.

2 The semantic reading of propositionality and the explanation of practical knowledge

Bartels and May set out to clarify what a theory of knowledge-how should provide and begin to give the outlines of such a theory. In their view, a theory of knowledge-how should explain the difference between practical and theoretical knowledge, the former being characterized by a number of distinguishing features. The proposal, then, is to explain this difference in terms of the reliance on non-conceptual capacities (or repres-

entations) in the case of practical knowledge and on conceptual capacities in the case of theoretical knowledge, instead of using propositionality as the main criterion. Their account of what is to be captured by a theory of know-how, and their proposed solution, are preceded by an illuminating discussion of the shortcomings of each side of the intellectualism vs. anti-intellectualism debate.

2.1 Merits and shortcomings of intellectualism

In short, Bartels and May claim that the intellectualists are right to concede that the distinction between knowing-how and knowing-that cannot be made in terms of the propositionality of knowing-that. Three readings of propositionality are distinguished:

- a representational reading, according to which the propositionality of some mental state depends on a sentence-like mental representation being tokened,
- a conscious-availability reading, according to which propositional representations are consciously available and can be expressed linguistically, and
- a semantic reading of propositionality, according to which the propositionality of some mental state depends on whether it is attributed as a propositional attitude.

It is argued that all three readings of propositionality are inapt for making the distinction between practical and theoretical knowledge. I take it that both the representational reading and the conscious-availability reading are implausible for independent reasons—the representational reading presupposes a language of thought, while the conscious-accessibility reading can arguably be undermined by considering cases in which someone would be said to know something she need not be able to express verbally, in terms of the proposition in question (this might involve some non-obvious logical consequences of one's occurrent beliefs). In addition, the semantic reading is what our best intellectualist account of knowledge-how, namely Stanley's, employs, and Bartels and May follow Stanley's analysis here.

According to the semantic reading of propositionality, whether some psychological attitude is propositional depends on the semantics of the locutions used to ascribe such attitudes. And our best current theories of the semantics of knows-wh locutions—i.e., of locutions that involve the verb "know" and some question word such as "who", "where", "what", "when", or, to that effect, "how"—tells us that knowledge-how is propositional—just as knowledge-that is. But as a result, it is argued, intellectualists are not able to explain the respective peculiarities of practical and theoretical knowledge—both are propositional. This is identified as the major shortcoming of intellectualism.

2.2 Merits and shortcomings of anti-intellectualism

The anti-intellectualists, on the other hand, lack a systematic criterion for the distinction between knowledge-how and knowledge-that. The introduction of different kinds of knowledge, based on different representational formats, by some anti-intellectualists is taken to be *ad hoc* (e.g., image-based knowledge and sensorimotor knowledge by Jung & Newen 2011). It is not based on an independently identified set of underlying representational formats that would explain the characteristic behavioral differences. Instead, it merely attempts to find alleged mental representational formats that intuitively fit the distinction (cf. Bartels & May this collection, p. 7). Further arguments to the effect that intellectualism is a non-starter are ineffective against Stanley's (2011) version of intellectualism (cf. Bartels & May this collection, pp. 10-11). An attack from Toribio (2008, reference taken from Bartels & May this collection) to the effect that Milner & Goodale's patient DF (cf. Milner & Goodale 1995) could not possibly have propositional knowledge of how to put a card into a slot presupposes that knowledge-how involves a *conceptual* grasp of how something is done or of what is acted upon. Roughly, Toribio argues that DF does not have proposi-

tional knowledge of how to put the card into the slot because she cannot report on the orientation of the slot. But Stanley acknowledges that some propositional attitudes involve the *non-conceptual* grasp of relevant states of affairs. In the case of DF, this involves the non-conceptual grasp of the orientation of the slot (cf. Stanley 2011, p. 172).

As a result, neither intellectualists nor anti-intellectualists provide a satisfactory account of knowledge-how. But both get some things right. The intellectualist is right in taking both knowledge-that and knowledge-how to be propositional. And the anti-intellectualist is right in requiring an explanation of the difference between these two kinds of knowledge, presumably in terms of underlying cognitive structures or kinds of mental representation.

2.3 Non-conceptual capacities as an explanation of practical knowledge

Bartels and May, then, pick up on the idea that practical knowledge might involve non-conceptual capacities, while theoretical knowledge is conceptual. They list a number of received peculiarities of practical knowledge that are to be captured by a theory of practical knowledge. And it is proposed that these peculiarities are the same peculiarities that result from a reliance on non-conceptual representations. Among the differential features of practical knowledge are its being context-bound, implicit, and automatic and effortless. Non-conceptual capacities, it is argued, just have these features. The result is a position that is intellectualist in form, because all kinds of knowledge are propositional, but anti-intellectualist in spirit, as the distinction of practical vs. theoretical knowledge is maintained. Practical knowledge is not reduced to theoretical knowledge; rather, the former is a non-conceptual form of knowledge while the latter is conceptual.

One effect of drawing the distinction between practical and theoretical knowledge in terms of *conceptuality* is that Bartels and May must follow Stanley in accepting non-conceptual forms of propositional knowledge. Patient DF cannot report on the orientation of the slot, but nevertheless she non-conceptually grasps its orientation such that she is able to put the card into the slot. Due to her successful performance, she is said to know how to put the card into the slot, making this particular form of knowledge-how non-conceptual. This somewhat departs from tradition, where concepts are usually taken to be the constituents of thoughts, while thoughts are likely understood in a Fregean way as the intensions of sentences, i.e., propositions. It makes sense, though, because propositionality is understood semantically while conceptuality is not. Whether some cognitive capacity is conceptual or non-conceptual is thought to depend upon the kind of mental representation involved.

3 Knowledge ascriptions and mental representations

3.1 Analyzing knowledge ascriptions vs. explaining cognitive capacities

Now, it's easy to believe that the whole debate around propositions, concepts, non-conceptual representations, and cognitive structure is highly convoluted and that it is difficult to properly disentangle the different issues that lie behind a larger number of related debates. One important distinction, I take it, which is not always properly made, is whether one is concerned with what *someone* does (the whole person) as opposed to what his or her *cognitive system* does. What happens between Stanley's and Bartels and May's discussion of kinds of knowledge, then, is a shift from a personal-level perspective to a level at which the cognitive system is described.

Stanley formulates a theory of knowledge-how on the basis of an analysis of ascriptions of knowledge-how. And the subject of clear cases of appropriate knowledge-how ascriptions are persons. Their brains (or whatever else might realize their cognitive systems) can at best derivatively be said to know how to do something. This is made especially clear in Stanley's analysis, according to which knowledge-how involves first-person thought (cf. 2011, Ch. 3). If someone knows how to do something he knows

that a certain way of doing something is a way in which he could do it himself. It is hard to see how someone's cognitive system could have this kind of first-person thought in a non-derivative way.

Bartels and May, on the other hand, want to explain the particularities of practical and theoretical knowledge in terms of the involved underlying representations. As they put it at the outset of their discussion, "'Explaining' here is rather to be understood as showing how the realization of necessary conditions for the possession of concepts coincide with those conditions that have to be fulfilled in order to achieve the step from practical to theoretical knowledge, each characterized by their respective peculiarities. In other words, we search for 'how-possibly-explanations' of the peculiarities of practical versus theoretical knowledge" (Bartels & May this collection). "How-possibly-explanation" is a term from mechanistic accounts of explanation that characterizes attempted mechanistic explanations that are not yet well corroborated by an independent identification of the components of the alleged mechanism. Bartels and May clearly appeal to structures underlying cognitive abilities. In addition, they employ a notion of concepts that is further developed in Newen and Bartels (Bartels & Newen 2007), where it is made clear that concepts are kinds of mental representations (cf. ibid., p. 284). Their interest thus lies in the differences between the cognitive architectural realization of practical and theoretical knowledge, not in the ascription conditions of kinds of knowledge to persons. And, as said, among the virtues of Bartels and May's paper is the clarity of the exposition of what is to be explained by a theory of practical knowledge in the first place: the behavioral or functional peculiarities of practical knowledge.

I understand that making a distinction between different endeavors in philosophy of mind in terms of personal vs. sub-personal level explanations is not always a particularly attractive way to go about the problem. The personal level brings with it a number of loaded presumptions, for instance, concerning the import of norms for action and belief. And I do not want to claim that such a rich conception of persons is involved in Stanley's discussion. Nonetheless it should be clear that Stanley is not interested in what the brain does, what its functional architecture is, or on which states it operates. He is interested in knowledge-how. And knowledge-how is something *someone* has: it's personal-level at least in the parsimonious way that it is something we attribute to each other.

In realizing that Bartels and May are really interested in the structure of cognitive systems possessing practical knowledge it becomes clear why they come to a conclusion that seems to be diametrical to what some other participants in the knowledge-how debate suggest. Bengson & Moffett (2007), for instance, argue that knowing how to do something is a matter of having a guiding conception of the way in which the subject of knowledge-how is to perform an activity. This captures that action guided by knowledge-how is a form of intelligent action—as opposed to something done by reflex, mere habit, or rote. It is an intellectual achievement to know how to do something. Bengson & Moffett (2007) argue that knowing how to do something requires an understanding of the activity at hand, and that understanding, in turn, is equivalent to the reasonable mastery of the concept that guides the action. Understanding is clearly something *someone* has; it is not a trait of his or her cognitive system that might rather be said to enable or mediate such understanding.

While the discussion in Bengson & Moffett (2007) sticks to the vocabulary of intellectual appraisal employed in the Rylean treatment of the topic, Bartels and May take a cognitive-psychological approach to the matter. For them, concepts are kinds of mental representations that serve to explain why someone has some ability. The notion of understanding does not figure prominently in their account. The difference to Bengson and Moffett's account can thus be traced back to different notions of what a concept is, which result from an interest in different perspectives on knowledge-how. Bengson and Moffett are interested in the conditions under which someone can be said to know how to do something, while Bartels & May want to ex-

plain the cognitive-psychological difference between practical and theoretical knowledge. When we adopt a semantic reading of propositionality and follow Stanley's analysis of knowledge-how, it becomes clear that these are very different endeavors. A theory of knowledge-how involves an analysis of what it is to ascribe such knowledge to someone; it is an investigation of the semantics of knowledge-how ascriptions and of our ways of talking. An explanation of the difference between practical and theoretical knowledge, on the other hand, tells us how corresponding abilities are realized by the cognitive system in terms of the employed representations.

One of the great virtues of a semantic reading of propositionality, then, is that it liberates us from drawing conclusions concerning cognitive architecture from the structure of ascriptions of mental states to subjects. Given that whether some mental state is propositional depends on the form of its ascription, there is no need to assume that the cognitive states described as propositional have to fulfill very specific conditions as to their structure and content. The correctness conditions for ascriptions of knowledge-how need not make reference to cognitive-architectural features of the subject of the ascription. And according to Stanley's analysis they don't. A knowledge state that is ascribed as propositional to some subject need not have propositional content itself nor be in any way structured such as to provide a vehicle for a propositional content. Indeed, Stanley (cf. 2011, p. 159) claims to have shown that having propositional knowledge states is entirely compatible with even an anti-representational conception of the mental. Nonetheless, knowledge-how is taken to be behaviorally real and efficacious, since it is implicated in certain actions and allows for explanations and predictions of behavior. We will shortly see how this can be so.

The liberation from cognitive-architectural commitments is somewhat occluded by Stanley, however, when he writes that he is interested in the *nature* of knowledge-how and that "[d]iscussions of semantics are often in fact discussions of metaphysics, carried out in the formal mode" (Stanley 2011, p. 144). This appears to imply that ascriptions of propositional attitudes are understood realistically, and this in turn seems to be possible only if we take such ascriptions to describe real relations among subjects and mental representations to have the propositional content in question. This is the main motivation for a representational theory of mind (cf. Fodor 1987). Thus, an investigation into the *nature* of knowledge-how that comes to the conclusion that knowledge-how is propositional seems to employ a representational reading of propositionality.

Fortunately, this strong form of correspondence between ascriptions of propositional attitudes and the mental states that are thus described is not the only way to take such ascriptions to describe real mental states. We are not condemned to instrumentalism by adopting a semantic reading of propositionality when we recognize that ascriptions of propositional attitudes might share their logical structure with measurement statements.

3.2 Saving realism about propositional attitudes while employing a semantic reading of propositionality: A measurement view

At least since the late seventies a number of researchers have argued that having a propositional attitude is not a matter of standing in a certain cognitive relation to an abstract object, i.e., some particular proposition, but that ascriptions of propositional attitudes describe (intrinsic) psychological states with the help of a domain of abstract representatives, i.e., the domain of propositions. Propositions play the same role in ascriptions of propositional attitudes as numbers play in measurement statements (cf. e.g., Churchland 1979; Davidson 2001; Beckermann 1996; Matthews 2007). Let's call this the measurement view of propositional attitudes.

According to the measurement view, ascriptions of propositional attitudes have a non-relational logical form. The attitude verb and its propositional complement together form a complex predicate that refers to an intrinsic

psychological property of the subject of the ascription. Thereby the difficulty that propositional attitudes must be understood as a relation between a subject and a proposition is avoided: they could just as well be properties of the subject. A weaker form of the measurement view is exhausted by this claim (cf. e.g., Churchland 1979; Davidson 2001).

A stronger form of the measurement view in addition holds that ascriptions of propositional attitudes really are measurements in the sense that a formal measurement theory can be formulated for propositional attitudes (Matthews 2007). And indeed a further investigation of the analogy between ordinary measurement statements and ascriptions of propositional attitudes reveals how abstract objects can be used to refer to causally efficacious properties of objects without themselves playing any causal role. A measurement theory shows that one formal structure, the so-called *empirical structure*, can be homomorphically mapped onto another formal structure, the *representational structure*, the empirical structure being a formal theory about the domain of objects of interest (cf. e.g., Krantz 1972). The details of this mapping determine what can be inferred about the empirical structure from the representational structure. In length measurement, for instance, ratios between numbers correspond to ratios between lengths of objects.

Propositional attitudes figure in the explanation and prediction of behavior. Thus, in the case of propositional attitudes, the empirical formal structure has to be a formal theory of, presumably, the psychological states that are causally involved in the production of behavior. The representational formal structure has to be an adequate formalization of the structure of propositions. Leaving open what the two structures eventually turn out to be, it is the stronger claim that ascriptions of propositional attitudes really are measurements that I want to endorse here. In particular, I take it that propositions are the elements of a representational structure of a measurement theory for propositional attitudes. Let us have a brief look at measurement theory.

In ordinary measurements, numerical scales are used to represent systems of certain measurable properties like length or mass, for example. Numbers are assigned to objects in accordance to a (procedural) rule. Somewhat simplified, in the case of length or mass measurement, a unit element is defined, and the number of unit elements that need to be concatenated in a certain way such as to be of equal length or mass, respectively, as the object that is measured, are counted. For mass the concatenation might be a simple lumping-together in the pan of a scale, while for length measurements unit elements are aligned rectilinearly. The number assigned to an object is equal to the count of unit-elements required. These numbers can then be used to represent relations among objects that are measured in the same way, i.e., on the same scale. An object that takes the number two on some length scale, for instance, is shorter than one that is assigned the number three, and it takes two objects of length two to get a concatenated object of equal length to an object that was assigned the number four on that scale. Thus, the system of objects is mapped with respect to their length onto the formal structure constituted by the natural numbers, including addition and the less-or-equal relation. The result is a homomorphic mapping from objects to numbers that respects certain additive relations among the lengths of objects. Correspondingly, the addition of numbers can be used to reason about the lengths of objects. Other properties of these objects and their relations might not be captured by the homomorphism. Which numerical operations can be used to reason about the objects' properties of interest depends on the scale that is used. In temperature measurement, for instance, most common scales do not respect ratios among temperatures, such that it does not make sense to say, for instance, that the air on a sunny day at 28° centigrade is twice as warm as the air on a day in fall at 14° centigrade.

Importantly, the objects' properties of interest are *holistically* captured by the numbers on a scale. It is in virtue of their position on the scale and the admissible operations that numbers represent certain (amounts of) properties of measured objects. There is nothing intrinsic to the number five that would make it a repres-

entative of a length of five centimeters or a weight of five kilograms. Individually, i.e., without their position on a scale, numbers don't tell us anything about the property they are used to represent—not even when the dimension (length, weight, …) is added. Thus, which numbers represent which property (or amount of a property) and which operations on these numbers can be used to reason about the property of interest depends on the employed scale. Neither are all relations among objects respected by the homomorphic mapping; nor can all relations among the numerical representatives be read back onto the objects of interest. This much can be said on the basis of basic measurement theory as formulated by Krantz et al. (1971).

Most interestingly for our present purposes, measurement in the sense of homomorphic mapping does not require numerical representatives. Elements of other abstract structures might just as well serve as the targets of such homomorphic mappings. This idea is exploited by Matthews (2007) and Dresner (2010), for instance. In particular, Matthews argues that the structure of propositions, including their inferential and evidential relations among each other and to perceptions, might thus serve as a measurement structure for certain psychological states of subjects: those that are commonly called the propositional attitudes. These psychological states are homomorphically mapped onto propositions—the causal relations among the former being captured by the inferential, and other relations among the latter. The propositions can then be used to identify psychological states and, importantly, to reason about them. Thereby, propositional attitudes can appear in explanations and predictions of behavior without the propositions themselves having to play any causal role in the cognitive system.

I take it that propositional structures represent psychological properties holistically—just as numerical structures represent properties of objects holistically. The homomorphic mapping as a whole respects certain relations among psychological states, and it is in virtue of their position within the propositional structure that particular propositions can be said to represent some psychological state. According to this view, there is nothing intrinsic to propositions that would relate them to particular psychological states. Thus, a measurement-theoretic notion of propositionality does not require the states that are referred to with the help of propositions to have propositional content themselves. Nonetheless, ascriptions of propositional attitudes can be understood realistically just as ordinary measurements are understood realistically. Once the mapping is fixed, it is an entirely objective question which proposition represents some given psychological state.

Neither numbers nor propositions are themselves taken to be causally relevant, but they are used to pick out a particular causally relevant property (or state) from a range of possible relevant properties (or states) as defined by the scale in use. Numbers on a meter scale are used to identify the length of objects. And it is the length of a pole, say, that is relevant for building a rack, not the number that is used to identify that length. The number is only relevant in relation to the numbers that are assigned to other parts of the rack. Similarly, propositions are used to identify psychological states that are behaviorally relevant. But it is the psychological states themselves that produce behavior, not the propositions that are used to identify them. Using propositions to identify psychological states leaves open how these states are realized within the cognitive system. All that is required is that the homomorphism holds. Indeed, drawing conclusions about the structure of the cognitive system from observations concerning properties of the propositional representatives of psychological states that are not warranted by the representational scheme (or "scale") arguably amounts to an over-assignment of structure (cf. Dresner 2004). As noted above, not all properties of the system of representatives are shared by what they represent. The homomorphism holds with respect to some structural features of the represented objects as determined by the used scale.

Stanley appears to be at least sympathetic to such a measurement-theoretic conception of propositions—he mentions Matthews (2007) ap-

provingly. And there is reason to believe that such a measurement account of ascriptions of propositional attitudes is a plausible candidate for a semantic conception of propositionality. As mentioned above, it has the advantage of giving a non-instrumentalist, realist account of propositional attitudes without buying into any direct correspondence between propositions and mental representations that would lead to a language-of-thought-like theory of cognition. While Fodorean Realism presupposes that ascriptions of propositional attitudes can only be correct if the involved terms refer to actual cognitive entities and relations (i.e., a functional/computational relation towards a mental representation, where the former determines the kind of attitude and the latter its propositional content), such a measurement account makes clear how a system of propositions could structurally (i.e., holistically) represent psychological states without having to assume that psychological states themselves have propositional content or, at any rate, are dependent on how they are ascribed. And it eschews some of the difficulties associated with more traditional accounts, such as explaining how propositions can both be the abstract, sharable contents of thoughts and at the same time psychologically real in that what someone does depends on the contents of his desires and beliefs, etc. (cf. Davidson 2001). The mental states represented by some propositional attitude ascriptions are psychologically real; the proposition itself need not be. First of all, it serves as a representative for that state.

The difference between Stanley's and Bartels and May's accounts of knowledge-how and practical knowledge, respectively, can then be understood as follows. Stanley is interested in the structure of the domain of abstract entities that are used to represent psychological structure, while Bartels and May are interested in the structure of the empirical domain of psychological entities and relations that are described in terms of propositional attitudes. Both endeavors are related in that they involve a phenomenon that we might call "knowing how to do something", and both use intuitive examples and empirical evidence as test cases for their accounts. But their respective goal is really quite different. In analogy to the measurement of length, one might say that Bartels and May are interested in giving a theory of how different bodies behave with respect to their length under some range of (physical) concatenation operations and comparison relations. For instance, welding two rods might have an influence on the resultant length of the composite rod such that it is not equally long as the two aligned but unwelded rods. Or, they might be interested in how length measurement transfers to smaller scales, such as molecular, atomic, or subatomic distances. Stanley, on the other hand, would be interested in the more formal properties of the numerical scales that are used for length measurement. He might ask how different scales relate. Just as the Fahrenheit scale can be transferred into the centigrade scale, knows-wh locutions might be transformed into know-that locutions.

Toribio's above-mentioned attack on intellectualism would then not be successful, because she has not realized that Stanley's theory really is about the structure of the representatives of certain psychological states, and not about the psychological states themselves. She offers some considerations concerning the structure of the psychological states that are meant to show that they could not possibly be propositional. But she does not give us a reason to think that the considered properties of certain cognitive processes face difficulties in terms of being represented by a propositional structure. Stanley then shows that there is no such difficulty. Toribio's discussion, on the other hand, is rather interesting for the development of an account of the cognitive structures that make it the case that someone knows how to do something.

Stanley's and Bartels and May's accounts are thus relatively independent of each other. Stanley's theory of knowledge-how can be seen as a partial investigation of the representational structure that we use to identify certain mental states. The approach of Bartels and May, on the other hand, is an attempt to give an explanation of certain cognitive capacities that are taken to be expressions of knowledge-how in terms of underlying mental representations. Given that propositional attitude ascriptions

measure psychological states, they aim to formulate a theory of the empirical structure. The measurement view first of all serves to disentangle these different endeavors and to shed some light on the relation between them, namely that the search for underlying representations and mental mechanisms is largely unconstrained by the structure of ascriptions of propositional attitudes by themselves and that conclusions about the empirical structure can only be drawn when the mapping is known as well.

This take is in line with both Stanley's theory and Bartels and May's explanation of practical knowledge. Stanley believes that cognitive psychology does not decide whether knowledge-how is propositional and refutes all objections to the contrary. The propositionality of knowledge-how is a matter of the semantics of their ascriptions. And Bartels and May give a characterization of the difference between practical and theoretical knowledge that is independent of Stanley's theory of knowledge-how. Practical knowledge has some behavioral/functional characteristics that are to be explained in terms of mental representations. The measurement view parts company with Stanley in his contention that he provides an investigation into the *nature* of knowledge-how. Rather, the measurement view is an investigation into a part of the representational structure of a measurement theory for a certain range of psychological states. We would not take an investigation of the centigrade scale to be an investigation of the nature of temperature.

4 Some final remarks

What the discussion around knowledge-how mainly shows, I think, is that the relation between propositional attitudes, cognitive structures or representations, and the behavioral evidence for their respective presence are still not well understood. It seems that we find it surprisingly difficult to disentangle our different ways of talking about ourselves and others in terms of what we believe, on the one hand, and in terms of the information that our brains (or some other division of the body-environment) process on the other. The main difficulty seems to be that we take ascriptions of propositional attitudes to mirror psychologically real relations between subjects and propositions. As such, we feel the need to tell a story about how propositional attitudes are realized in the brain. The measurement view enables us to employ a less committal way of representing someone's psychological states that largely leaves open how the cognitive system manages to coordinate its behavior with the environment. The constraints that are put on cognitive architecture by successful ascriptions of propositional attitudes are really quite weak. To be sure, if the measurement view is to be proven correct, there must be a homomorphic mapping from an empirical structure into the propositional structure. But homomorphisms abound. Any number of homomorphisms can be found between any two structures. And as far as we can tell, the structure of propositions is homomorphic to the course of the sun and the stars. This is why we can employ intentional explanations for just about any system we want. The measurement view becomes informative when we have formalizations of the two structures and a measurement theory that describes the particular homomorphism of interest that holds between them. Then we can tell what we learn about the empirical structure by means of reasoning about propositions. An attempt to infer the empirical structure from the representational structure alone must fail.

In the case of propositional attitudes, I ultimately doubt that the mapping is best conceived as holding between internal cognitive architectural structure and propositional attitude ascriptions. Propositional attitudes might rather be measurements of structures of observable behavior. Propositional attitudes are ascribed on the basis of observable behavior together with some standards of folk psychology—such as that one believes what one sees or what one is told by trustworthy peers. Propositions might provide standardized ways of identifying behaviorally relevant circumstances, including what someone saw, was told, and aims for, that would otherwise have to be identified less systematically by way of particular situations and individual histories. I can tell that you know that the earth is an approximate sphere—you've

certainly learned it somewhere. I do not need to go back in your learning history until I find the moment in which someone uttered a sentence with the respective meaning—which would allow for similar predictions and explanations.

Taking propositional attitude ascriptions to be measurements of structures of observable behavior would also be very much in line with Ryle's original, rather behaviorist discussion of knowledge-how. With reference to our use of mental vocabulary to describe the behavior of others, Ryle writes that "we go beyond what we see them do and hear them say, but this going beyond is not a going behind, in the sense of making inferences to occult causes; it is going beyond in the sense of considering, in the first instance, the powers and propensities of which their actions are exercises" (1949, p.51). The powers and propensities are in turn understood as complex dispositions, describable in terms of their acquisition and manifestation conditions. The move from a structure of observable behavior to a propositional structure would take the place of acknowledging the role of so-called internal states; for now we can exploit inferential relations among propositions for explanation and prediction. But these propositional attitudes need not be understood as internal states. Instead they could be taken as measurement representations of Ryle's powers and propensities. Ryle notwithstanding, however, we need not give up cognitive psychology. Ascriptions of propositional attitudes and cognitive representations would relate via the behavior that each is to explain—they provide complementary explanations of the same behavior. For Bartels and May's explanation of practical knowledge this would mean that it is not part of a theory of an empirical structure for measurements of propositional attitudes. It would be a cognitive-psychological explanation of a behaviorally characterized psychological phenomenon called practical knowledge. The main point of this commentary, though—namely, that Stanley and Bartels and May are up to different things and that little can be inferred about cognitive architecture from Stanley's analysis of knowledge-how—remains untouched.

In closing, I want to mention one reservation that can be held against the particular cognitive-architectural account presented by Bartels and May. Given that concepts remain a vexed issue in contemporary discussion, that they are traditionally closely related to propositions, and that it is notoriously difficult to find good grounds for attributing representations of a certain kind and with a specific content to cognitive systems that are not able to verbally express their beliefs, a *semantic reading of conceptuality* might be worth considering. Concepts might be broadly conceived of as the constituents of thoughts, i.e., (trains) of propositional attitudes. In our case: whatever is a constituent of knowledge-how would count as a concept. One effect of this would be that the reliance on non-conceptual capacities in order to explain certain forms of knowledge-how, like that of patient DF, would not be open to Stanley. But as an alternative, Stanley could accept demonstrative concepts and claim that some forms of knowledge-how are distinguished by their involvement. Admittedly, Bartels & May would have to change their terminology; their abilities approach to concepts is not compatible with concepts being the constituents of propositions alongside a semantic reading of propositionality. But nothing much seems to be lost by this. Quite possibly, mentalistic vocabulary is just not the best way to come to grips with the structure of cognitive systems.

References

Bartels, A. & May, M. (2015). What a theory of knowledge-how should explain. In T. Metzinger & J. M. Windt (Eds.) *Open MIND*. Frankfurt a. M., GER: MIND Group.

Bartels, A. & Newen, A. (2007). Animal minds and the possession of concepts. *Philosophical Psychology*, *20* (3), 283-308. 10.1080/09515080701358096

Beckermann, A. (1996). Is there a problem about intentionality? *Erkenntnis*, *45* (1), 1-23. 10.1007/BF00226368

Bengson, J. & Moffett, M. A. (2007). Know-how and concept possession. *Philosophical Studies*, *136* (1), 31-57. 10.1007/s11098-007-9146-4

Churchland, P. M. (1979). *Scientific realism and the plasticity of mind.* Cambridge, UK: Cambridge University Press.

Davidson, D. (2001). What is present to the mind. In D. Davidson (Ed.) *Subjective, intersubjective, objective* (pp. 53-68). Oxford, UK: Oxford University Press.

Dresner, E. (2004). Over-assignment of structure. *Journal of Philosophical Logic*, *33* (5), 467-480. 10.1023/B:LOGI.0000046068.00813.83

——— (2010). Language and the measure of mind. *Mind & Language*, *25* (4), 418-439. Blackwell Publishing Ltd. 10.1111/j.1468-0017.2010.01396.x

Fodor, J. (1987). The persistence of the attitudes. In J. Fodor (Ed.) *Psychosemantics* (pp. 1-26). Cambridge, MA: MIT Press.

Jung, E.-M. & Newen, A. (2011). Understanding knowledge in a new framework: Against intellectualism as a semantic analysis and an analysis of mind. In A. Newen, A. Bartels & E.-M. Jung (Eds.) *Knowledge and representation* (pp. 79-105). Stanford, CA: Centre for the Study of Language & Information.

Krantz, D. H. (1972). Measurement structures and psychological laws. *Science, New Series*, *175* (4029), 1427-1435. 10.1126/science.175.4029.1427

Krantz, D., Luce, D., Suppes, P., & Tversky, A. (1971). *Foundations of measurement.* New York, NY: Academic Press.

Matthews, R. J. (2007). *The measure of mind.* Oxford, UK: Oxford University Press.

Milner, A. D. & Goodale, M. A. (1995). *The visual brain in action.* Oxford, UK: Oxford University Press.

Ryle, G. (1949). *The concept of mind.* Chicago, IL: University of Chicago Press.

Stanley, J. (2011). *Know how.* Oxford, UK: Oxford University Press.

Toribio, J. (2008). How do we know how? *Philosophical Explorations*, *11* (1), 39-52. 10.1080/13869790701599044