Truth matters

The correspondence theory of truth meets an educational theory

Tone Kvernbekk

This article is a tentative drawing together of two realms; truth theory and educational theory. More specifically, I shall explore the problems and possibilities of the correspondence theory of truth in connection with educational theories. To do this, one minimally needs a viable conception of educational theory and a viable version of the correspondence theory. Bringing the two together may be doubly fruitful, in the sense that both potential and problems in the correspondence theory will be more easily identifiable when it can sink its teeth into a sophisticated, concrete example. And conversely, application of a truth theory may expose potential and problems both in the concrete educational theory and in the theory conception employed.

Why should we be concerned with truth? Many writers famously reject «traditional» epistemic values such as truth, rationality and objectivity. Let me turn the question around and ask why we should not be concerned with truth. What would we miss? There are manifestly beliefs whose truth (or justificatory) status everybody cares about, e.g. medical diagnoses and proposed treatments. This is the case with many educational beliefs as well, since the stakes are high for many involved parties; including students, parents and teachers. Educational researchers should be concerned that they do not mislead their audiences. John Searle (1995) writes that the word true is a member of a conceptual family that also contains trustworthy,
genuine, accurate, reliable. Thus, when a statement is deemed true, an implicit evaluation of credibility and genuineness goes with it.

There are several theories of truth. In addition to the correspondence theory, there is the coherence theory, the instrumentalist theory, the deflationist theory, the redundancy theory and Tarski’s theory (and maybe more) (Kirkham, 1997). I have chosen the correspondence theory for two reasons. First, the idea of truth as correspondence seems to be intuitive; it is most certainly the everyday conception of truth. Its intuitive character derives from the fact that statements in general attempt to describe how things are in the world, a world that exists independently of the statements. I venture the hypothesis that in general no amount of philosophical sophistry can convince people that the relationship between statements and reality is unimportant. Second, with some qualifications, I wish to defend it. This defense, e.g. against attacks from constructivist perspectives, will however have to be implicit. I will defend it by showing what the theory says and clear up some common misunderstandings. Depth of analysis is chosen over breadth. It is by no means intimated that the correspondence theory is equally applicable to all forms of educational theorizing.

In this article, I shall first discuss theories as truth bearers and describe a specific educational theory to be used throughout as an example. Next, I shall apply the correspondence theory to my chosen educational example; the main topics will be isomorphism, simplification and reference. Finally I shall discuss the problem of truth makers and gradation of truth.

Theories as truth bearers

A truth bearer is anything that can be accorded a truth value (true or false). As can be expected in philosophy, there is some disagreement as to what kind of «things» can serve as truth bearers. Most commonly mentioned are beliefs, propositions, sentences, statements, thoughts and utterances. Truth and falsity do not apply to linguistic formulations such as proposals (accepted or not accepted), decisions (followed or not followed), promises (kept or not kept) or orders (obeyed or not obeyed). Unsurprisingly, theorists have settled for different truth bearers for their truth theories. Bertrand Russell (1912) chose beliefs and John Austin (1950) chose statements; yet they both represent the correspondence theory of truth.

For some reason, general accounts of truth theories do not mention scientific theories as possible truth bearers (see e.g. David, 2004; Kirkham, 1997). This may seem a rather conspicuous sin of omission, since theory is the most common form of representation in science and since science is interested in and committed to truth. A possible explanation why theories are neglected as truth bearers is the complexity and lack of clarity of the concept. This is not to suggest that belief is a simple and transparent concept – Russell’s discussion shows that beliefs can be quite complex entities. Still it does seem that theories add an extra layer of complexity. The favorite examples discussed by many writers on truth, such as «Snow is white» and «The cat is on the mat», do not have much to offer to the present discussion – what can be said about their truth value has little if any bearing on the truth problem of educational theories. The correspondence theory deserves a real challenge, and theories, being highly complex representations, make one.

There are rival conceptions of scientific theories. I choose here the semantic conception of theories, which is an adequate, rich and detailed theory conception. I will simply assume it; it has been adequately defended elsewhere (e.g. Giere, 1979; Suppe, 1989; van Fraassen, 1989). The short version is as fol-
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No (scientific) theory characterizes a phenomenon in all of its complexity. Rather it describes it in terms of a few selected parameters which make up a «model» of the phenomenon. Theories may contain postulates that tell us how the parameters are related. The values of the parameters determine the state of the model, and the laws of the theory tell us which states it is possible for the model to assume or show, and how these change over time. The laws do not describe the behavior of the phenomenon, but the behavior of the model.

For example, a descriptive theory such as classical behaviorism characterizes a class of human behavior (learning) in terms of two parameters, stimulus and response. This example serves to illustrate one of Suppe’s main points, namely that theories have an «as if» relation to the phenomenon within their scope – they treat it as if it consisted only of the selected parameters, or as if the selected parameters are the only ones with a non-negligible influence. S-R theory thus treats behavioral learning as if stimulus and response were the only parameters having an influence. The abstraction of parameters (based on phenomenon, data, previous knowledge) has several effects; one of which directly concerns us here. Theories, Suppe says, are not literally true about the phenomenon. The theory is about the model, in this case a population of idealized individuals. S-R theory is obviously false about actual individuals, since their learning depends on a number of other factors in addition to stimulus and response. So in what sense, if any, is a theory true? This question will be explored in the next section.

Concerning educational theories, it is my contention that they can all be fruitfully analyzed using the semantic conception (this again shall simply be assumed, as it is defended at length elsewhere; see Kvernbeck, 2005). The semantic conception quickly brings out the structure of the theory, by directing attention toward its parameters, postulates, idealized entities and laws; all of which make good sense because they show what a theory says and how it says it. But we do run up against a slightly different problem, which concerns the uses of educational theory.

If one subscribes to the twin views that different uses require different types of theory, and that educational theories basically are means (recipes) to achieve goals, then the truth problem as here stated vanishes. Means are not true or false, but more or less effective. I, on the other hand, subscribe to the view that one and the same theory can have different uses – it can describe, explain or guide intervention, all according to the intentions of the user. This is of some importance for the present analysis, since I have chosen for my example a normative goal-directed theory, namely Rosalind Driver’s (1989, 1995) constructivist science education theory. This theory is normative in that it contains a goal, something of value to be attained, but it is also largely descriptive. Hence, in principle it admits of truth or falsity in the correspondence sense. This claim will be substantiated throughout the article.

Goal-directed theories generally consist of the following elements and structures: a (desired) goal-state; a law describing a sequence of state changes in the «entity» that moves toward the goal-state; parameters describing this «entity»; parameters describing the environment. The basic idea in all theories of this kind is that the «entity» in question moves toward the goal-state at least partly as a function of its interaction with the environment; this implies that normative theories contain a descriptive, empirical component. The state of this «entity» changes with changes in any of the parameter values. «Entities» in such theories may be of different kinds, e.g. individuals, groups,
entire populations, institutions or even nations.

Rosalind Driver’s (1989, 1995) science education theory is both complex and sophisticated. The theory is about how students’ unscientific beliefs about natural phenomena can become more scientific, how their attitude to science can be changed in a way that allows scientific ways of thinking to assume a greater place in the daily life of students, etc. The goal-state is thus broadly conceived; it incorporates a number of different, but related sub-goals. The «entity» in this theory is an individual student, an abstract, idealized student who is viewed as representative of the population that falls within the scope of the theory.

Driver has a large number of parameters describing this student. They might roughly be categorized as follows (all come with a number of sub-categories): Demography, metacognition, understanding of science, emotion, general beliefs, disposition for participation, content specific beliefs. The goal-state is defined in terms of the values on some of these parameters, but not all. Central to the theory is change in the students’ content specific beliefs (e.g. concerning the nature of light, ecological relations, etc) and their understanding of what science is – it is changes in these values that bring the student toward the goal-state; not, say, demographic changes. This of course raises the question of whether demography (age, background) should be included in the theory at all.

Concerning environmental parameters, they can tentatively be categorized as teacher encouragement, teacher feedback, teaching strategies, presentation of standard science, student–student interaction, and resources (all with a number of sub-categories). The theory tells us that interaction between individual and environment thus described brings about desired changes in values of (certain) parameters concerning the individual. Driver’s theory contains at least two idealized parameters, both idealized in terms of mean values. For example, the highly important parameter of content-specific beliefs represents the «mean» beliefs about natural phenomena that a certain age-group has. The other idealized parameter is an environmental one; with a value idealized to the kind of experiences that generally have positive effects on students’ movements toward the goal-state. Both idealizations are results of much empirical research.

Driver describes her theory as constructivist. I think this is best accounted for within the theory structure as a central postulate. It concerns how the parameters are thought to be related, and how learning (the phenomenon that the theory is about) is thought to occur. A theoretical law is a kind of heuristic; it does not refer to anything empirical, but aids the thought in understanding how the model changes over time. It thus guarantees that the dynamic aspect of both phenomenon and theory are kept in focus.

Educational theories and correspondence

Now what can we say about the truth value of a theory like Driver’s (1989, 1995)? Let me first point out that its normative character may pose an extra difficulty, since normative claims seem to fall into the same category as proposals, decisions, promises and orders and hence have no truth value. In addition, theories are of a generalized nature; they deal with classes of phenomena rather than individual instances.

But before we can delve into these and other problems, the correspondence theory of truth must be briefly described. I suggested above that truth as correspondence is an intuitive idea; namely that truth is a relation to reality. The theory basically says that a sci-
cientific theory (or any truth bearer) is true if it corresponds to some fact, situation or state of affairs in the world; that is, describes the world as the world actually is. It is more properly understood as a family of theories rather than one single theory (David, 2004). The truth making relation is called correspondence, and the portions of reality that make truth bearers true are called facts. For example, the assertion that there is a cup on my desk is made true by the independent fact that there actually is a cup on my desk. If the fact does not obtain, the assertion is false.

The correspondence theory has, deservedly or not, fallen into discredit. Many writers (e.g. Alvesson & Sköldberg, 1994) attach the label «positivist» to it, and in some circles this in itself indicates something negative, bad or problematic. Without going into this particular nexus of problems, I would like to briefly suggest that anti-positivists may not get as much mileage out of this labeling as they think. The positivist Otto Neurath (1959, p. 291; emphasis original) explicitly rejects the correspondence theory: «Statements are compared with statements, not with «experiences», «the world», or anything else.»

There is another misunderstanding that concerns us more; the single truth problem. Hilary Putnam (1993, p. 49) expresses it as follows, describing a view he calls metaphysical realism: There is exactly one true and complete description of ‘the way the world is’. Truth involves some sort of correspondence relation between words or thought-signs and external things and sets of things.

But this is surely a misconstrual. It is important here to nail down the principle of conceptual relativity; the idea that different, but compatible theories may be true (or adequate) at the same time. This honors the rather commonplace fact that the same phenomenon can be described in different ways; these ways may be compatible, all true, all false, or they may be in genuine conflict. There is nothing in the correspondence theory that rules out conceptual relativity (not to be confused with relativism) of this kind. At any rate, this is a vital principle to hold on to. It is furthermore compatible with all theories of truth.

Isomorphism and simplification

It should be evident from the description of Driver’s theory that the truth problem is exceedingly complex. Let us begin by looking at the truth making relation; correspondence. This relation is criticized for being both mysterious and unobtainable. According to Searle (1995), historically the correspondence theory goes hand in hand with the picture theory of meaning, the theory that sentences mean what they do because they are conventionalized pictures of facts. This, as we shall see, poses problems for the correspondence theory.

Now, what shall we take correspondence to mean? According to Kirkham (1997), there are two major types of correspondence; congruence and correlation. The difference between these two lies in their strength. Congruence is a strong form of correspondence; it demands structural isomorphism or a one-to-one mapping between all concepts, elements, structures and relations in the (scientific) theory and its corresponding fact. This conception seems to lie behind many everyday and scientific considerations of truth, including Putnam’s mention of completeness in his understanding of the correspondence theory. When people claim that a description is not true unless it matches down to the smallest detail, it is the same implicit requirement of isomorphism that lurks in the background. It may also be connected to the picture theory of meaning alluded to above, and serve to explain common meta-
phors for truth such as mirror, match, copy or reflect.

However, if isomorphism is a requirement, then no scientific theories are ever true. The semantic conception of theories clearly shows that theories are simplifications; they rely on abstraction of parameters deemed relevant. Hence, there is never a one-to-one mapping; there will always be factors, properties and causes characteristic of the phenomenon that fall outside the scope of the theory. This is the case also for Driver’s theory, despite the occasional suspicion that it aims at completeness. Just imagine how many descriptors of the phenomenon that can be had concerning individual characteristics, social relationships, school grounds, sounds, colors, etc., that are not found in the theory. But does it follow that the correspondence theory of truth cannot be applied if completeness is unattainable? Or does the correspondence theory entail that selection of parameters necessarily makes scientific theories untrue? It may be that some correspondence theorists require that all details match for a truth bearer to be true, but it seems to me that there is nothing in the basic idea of the theory itself that demands this – and it would be impossible anyway.

It may also be a consideration like this that lies behind Suppe’s (1989) claim that theories are not «literally» true of the phenomenon within their scope. Suppe, it will be recalled, states that all theories have an element of «as if»; they treat phenomena as if only the selected parameters exert a non-negligible influence. As a consequence of this, Suppe cashes out his conception of truth in terms of counterfactuality. Theories, he says, are not literally true but counterfactually true. By this he means that the theory describes the phenomenon as it would have been if the selected parameters were the only ones to exert an influence on the phenomenon’s behavior. But in fact they are not, hence they theory is true only counterfactually.

This move to circumvent the problems of an implicit ideal of isomorphism seems to me to be unfortunate, since we could claim counterfactual truth for all theories regardless of what they say and how we otherwise evaluate them. It would suffice to adopt the weaker sense of correspondence, namely correlation. Giving up the idea of one-to-one mapping does two things for us. It allows us to turn our attention away from the particular elements of the theory and care more about the whole, and it opens the path to truth in degrees; the idea that a theory may be more or less true or roughly true. Even the principle of conceptual relativity (plural truth) seems easier to accommodate with the correlation conception of correspondence. As I have suggested, I do not think that the idea of correspondence between a phenomenon and a simplified model of that phenomenon is terribly problematic, once we are willing to deal in correlations and degrees of truth. Such a move entails giving up the clarity of the either true or false, and replacing it with a more fuzzy roughly.

Reference

Then there is the question of reference. This is a difficult problem with many ramifications. Let me begin my foray into it with a detour. In his discussion of (historical) narratives, Louis Mink (1978) maintains that whereas the constituent elements of a narrative (e.g. descriptions of actions, intentions, events, causes, etc) may be true or false, the narrative form itself (a beginning-middle-end structure comprising a whole) simply is not a truth bearer at all. The reason for this is that the narrative form has no reference. It is a poetic construction that arises from the telling of the story, not from the events told
about. Narrative form does not refer to anything in the world, it is not about anything. It just imposes a certain order on a flow of events that, if anything, distorts the phenomena. Admittedly, Mink is not very explicit about his views on truth. But he clearly relies on the correspondence theory of truth, and he seems to presuppose that for a linguistic construction to be a truth bearer, it must refer to something that exists in the world. He is not entirely consistent, though. If narrative form is not a truth bearer, it is equally incapable of truth and falsehood. Mink tends to treat it as incapable of truth, but doomed to falsehood.

It may well be that Mink’s (1978) views reflect beliefs about reality and reference that are quite common in research communities. At this point realism enters the picture. The correspondence theory says that a theory (belief, statement) is true if it corresponds to some fact or phenomenon that is outside the theory itself; hence, the correspondence theory entails realism, but not vice versa (realists are of course free to use any truth theory). The correspondence relation, Marian David says, stands or falls with a general theory of reference (David, 2004). Realism is roughly the view that there is a way that things are, independently of human minds or conceptual schemes.

This has been the focus of much criticism leveled against the correspondence theory of truth: just how independent do we assume this reality to be? We may have no access to it except through the very belief or theory that we are investigating, and since judgments of correspondence requires an overview of both truth bearer and truth maker, the correspondence theory takes on a circular character. Beneath here lies the concept of reality. I have no wish to get embroiled in ontological discussions, in fact I do not think that a definition of reality is necessary (should there be one). I do not have in mind a noumenal reality that is in principle inaccessible so that no correspondence is possible. I settle for an external, experienced reality that we have access to. There is a way that things are independently of me, but not independently of all individuals at the same time. This reality is social and natural, contingent and changeable, none of which precludes correspondence.

Recall that Mink (1978) requires that (potential) truth bearers have a reference; that they refer to something that exists independently, to be accorded a truth value. What does this look like for educational theories? Let us begin by looking at the constituent elements of Driver’s science education theory. Does the correspondence theory demand that all those elements have references for her theory to be true? On the face of it, the intuitive correspondence idea as I have described it does not seem to entail any specific requirements of this sort. Driver’s theory clearly contains parameters that have no references; the most obvious one being the goal-state (despite the fact that it is intended to refer in the future). This is a normative entity, and I have characterized the theory as a normative theory. Now, can normative theories have truth values at all? I would argue that they can. The heart of Driver’s theory is the students’ movements toward the goal-state as a function of certain interactions with the environment. Whether this happens or not is an empirical question, and Driver has conducted a number of inquiries to establish, in great detail, how such processes take place and develop.

So the goal-state has no (present) reference. What of the other parameters? Students, teachers, classrooms and textbooks clearly exist, but what about such parameters as metacognition, emotional aspects, encouragement and feedback? The answer depends on whether one declares oneself a realist or an antirealist. There is a class of para-
meters that is even more interesting, namely the idealized ones. I have suggested that Driver’s theory contains (at least) two; both are averages, which must be said to be frequently used in the social sciences. Averages are semi-idealized entities; they may be realized in some instances. From other disciplines we get clearer examples of idealizations, like frictionless planes and empty space – parameters with values that cannot be satisfied.

The question of reference is both tricky and intriguing.

Suppe (1989) finds it unreasonably strict to demand that all parameters have a reference for a theory to be true, or perhaps for the correspondence theory to be applicable at all. Most, if not all, theories contain idealized parameters and an absolute reference requirement would necessarily render them all false (or a non-realist truth theory would have to be applied). But if we allow parameters with no reference, we face the task of deciding how many such parameters can be allowed in a theory, whether some central parameters should be required to have references, and other troublesome problems. And finally, concerning reference, there is the additional problem that theories are general. They characterize classes of phenomena, not individual instances. And what does a class refer to?

The problem of reference remains even if we give up the congruence version of the correspondence theory and its demand for isomorphism. Austin (1950, p. 125), who also advocates the correspondence theory, says that correspondence between truth bearer and phenomenon is conventional, such that «[t]here is no need whatsoever for the words used in making a true statement to ‘mirror’ in any way, however indirect, any feature of the situation or event». This we can recognize as correlation, the weaker type of correspondence. The picture metaphor is abandoned. This view allows that a theory may be deemed (mostly) true even though many of the phenomenon’s factors, properties or causes are left out, as we also saw in the preceding section. An insistence that this reduces truth to approximation would seem to presuppose that isomorphism is the ideal, even if it is unattainable.

While the congruence and correlation types share the reference problem, the correlation type poses another challenge. Theories are based on selection of parameters, and are not isomorphic to the situations or state of affairs they assert. I suggest that considerations of the truth of educational theories will have to include some sort of relevance judgments concerning the parameters. Are they relevant? Representative? Justified? Too many or too few? Should some be excluded and others included? It does seem unreasonable, though, to treat relevance judgments as integral parts of the correspondence theory. The job of the correspondence theory is minimally to tell us what it means for a truth bearer to be true, what is means for it to be false, and what the truth makers are. Relevance is not intrinsically or necessarily connected to truth (both relevant and irrelevant beliefs may be true), so the source of relevance judgments lies elsewhere.

Truth makers

Is Driver’s science education theory true? I do not know; that is a question for a separate investigation. But what would serve to make it true? What could the truth makers be? General formulations of the correspondence theory tell us that truth bearers are true if they correspond to facts. Before Russell, theorists talked more about correspondence to things. But facts are not things. So what are they?

A few simple examples might be in order. The proposition that snow is white is made true by the fact that the substance we call
snow actually is white. The proposition that Othello believes that Desdemona loves Cassio is true if it is the case that Othello has such a belief (Russell’s example). All of this seems natural and recognizable from everyday life. But some critics find fact to be just as mysterious as correspondence. Facts are generally expressed with a ‘that’-clause which repeats the content of the truth bearer, as seen in the examples. Since such clauses seem to refer both to the truth that Othello believes such and such and to the fact that Othello believes such and such, it is a common criticism that the correspondence theory conflates facts and truth. In order to identify a fact you have to state the corresponding true statement – if you can say that you know the one, you also know the other. This would make facts too closely tied up with truths to serve as truth makers, or alternatively it would make the concept of truth redundant (David, 2004).

I shall appeal to John Searle (1995) to answer this objection to the correspondence theory. Fact, he says, is a general term for all the different «somethings» in virtue of which a truth bearer is true. Whereas he grants that in order to specify a fact we must state a true statement, he insists that it does not follow that facts are essentially linguistic. As he puts it:

The whole point of having the notion of «fact» is to have a notion for that which stands outside the statement but which makes it true, or in virtue of which it is true, if it is true. On this account facts are not complex objects, nor are they linguistic entities; rather they are conditions in the world that satisfy the truth conditions expressed by statements. (Searle, 1995, p. 211)

According to Searle, we do not need a metaphysical notion of fact. Anything sufficient to make a truth bearer true is a fact. There is no need to think that facts must be parts of some (unknowable) Ding-an-sich world. In a similar demystifying vein, correspond is a verb for describing the various relations between truth bearers and the facts when the truth bearers are true. And once the notorious picture view has been rejected, negative and hypothetical facts can be allowed.

It is time to return to Driver’s (1989, 1995) theory. What kind of truth makers would it take to make this theory true? What state of affairs would have to obtain? What sort of facts would we have to identify? What kinds of facts should we allow? This last question adds an interesting problematic twist that I will only mention. Assume that Driver believes that students learn physics by hands-on experience. On an external, «absolute» understanding, her belief is made true by the fact that students actually learn that way. On an internal, «relative» understanding, her belief is made true by the fact that this seems to Driver to be so. On both views, the claim is true because a fact makes it so. But clearly the views invoke different facts (Siegel, 2007), and users of the correspondence theory should tread carefully here.

It is not a productive strategy, I think, to focus on the constituent elements of the theory, look for corresponding facts and so to speak count them. It is not obvious that a parameter, even if it has a reference, has a fact tied to it. Nor is it obvious that a theory can be meaningfully partitioned into sentences each with a corresponding fact. It seems better, but by no means easier, to look at the whole rather than at the elements. In such a perspective, truth and fact are not conflated; since Driver’s theory simply cannot be expressed in one sentence. Rather, I suggest one would have to identify a range of facts to be satisfied for the theory to be judged true.

This leads us back to the circularity problem briefly mentioned above; and whether our only access to the phenomenon is through the theory. While this may be a
problem in principle, it seems to me that it may not be an insurmountable problem in this particular context. There are many views about the teaching and learning of science, and the facts identified for Driver's theory can be formulated in many ways and also be perfectly compatible with other theories. To judge the truth value of the theory, the point of departure will have to be the basic empirical claim made by the theory, namely that students (characterized by a selection of parameters) move toward a certain goal-state as a function of a certain interaction with the environment (also characterized by a selection of parameters). The postulate construction is intimately connected to the change that is here depicted; described by the heuristic of a theoretical law.

The theory is true if the change actually happens. But how do we find that out? What would we have to look at? How should we formulate statements of fact that incorporate and accommodate the theory's parameters, postulates and laws? And whereas the fact that grass is green is sufficient to establish the truth of the proposition that grass is green, how should we identify sufficient facts for Driver's theory? Will we get sufficient truth conditions if we test the students' scientific beliefs several times during an academic year and find that they actually do move in the desired direction? If we focus on student results, have we thereby slipped into thinking that effectiveness is enough and truth is irrelevant? Are there facts we should deem to be necessary for truth, in the sense that if they do not obtain, the theory is false? I do not know the answer to any of these questions, but I would like to point out that theories can be tested even if the testing is a highly complex enterprise. Some of the issues here touched upon may actually be built into the theory in the first place, since the values of some of the parameters are derived from empirical results.

These considerations naturally lead into approximation, or truth in degrees. What if we have identified necessary truth conditions and only a certain number of them actually obtain? Are we then in a position to say that the theory is approximately or roughly true? That is, should we allow truth to admit of degrees? According to Searle, we need to allow for this kind of approximation, and there is nothing in the correspondence theory that says we cannot. This is especially important if we settle for the correlation version. Things in the world, such as construction of (more) scientific beliefs about natural phenomena, may be more or less, but not entirely, the way that the theory says they are.

This gradation can be understood in different ways. For example, a given number of truth conditions may obtain, but not all. Or a number of students may exhibit the desired change, but not all. The question then transforms into a slightly different one: how many unobtaining truth conditions can be tolerated before the theory must be deemed to be false? Falsehood, it will be noted, is explained by the correspondence theory as absence of corresponding facts. Regardless of interpretation of gradation, however, it remains that the issue is settled by argument, not by an automatic counting of facts.

**Conclusion**

I have in this article tried to explore at least some of the issues that would be involved in applying the correspondence theory of truth to educational theories, exemplified by a science education theory. My analysis has brought no solutions, but rather exposed a number of problems. I believe that most statements – but certainly not all – purport to be about some phenomenon, and I follow Searle in thinking that statements are considered reliable and trustworthy if they tell us
how the world actually is. Furthermore, I think that considerations of truth, in the correspondence sense, underlie many research (and everyday) concerns; including lying and faking data – descriptions that only make sense against a background of assumed truth. The philosophical (and practical) difficulties in the correspondence theory should therefore not tempt us to give it up.

This article betrays my general partiality to applied approaches to philosophy. Epistemological models and views should keep in touch with how scientists actually work to be relevant; while at the same time epistemologists can illuminate and sometimes even improve general scientific (or other) argumentation. The use of a concrete example of a truth bearer is important for two reasons. First, it exhibits the highly complex structure of educational theories in some detail, and the discussion can therefore attain a higher degree of precision than it otherwise would. Specifically, I hope to have demonstrated that even normative, goal-directed theories have an empirical heart. Second, a detailed example forces a more fine-grained analysis of the correspondence theory. I hope to have shown that a tenable version minimally must reject isomorphism and allow truth in degrees; a move that admittedly complicates matters considerably.

My analysis illustrates that theory as truth bearer poses quite a challenge to any conception of truth. Theories are complex representations; they are necessarily based on selection and they may have parameters whose values in principle cannot be satisfied. To accommodate this, the correlation version rather than the congruence version of the correspondence theory must be employed. If one wishes, as I do, to retain a relationship between representations and reality, one also is forced to deal with scientific realism and the problems of reference. I have by no means exhausted the problems involved, but I hope to have provided a more nuanced understanding of the correspondence theory, cleared away some common misunderstandings, and thus hopefully, albeit implicitly, defended the theory.

It may seem that employment of the correspondence theory of truth in the educational realm leads to insurmountable difficulties. Nonetheless, the complexities involved in discussing the truth of educational theories should not deter us from doing just that. I do not see why a researcher with adequate knowledge of the phenomenon should not be able to identify (possible) truth conditions for Driver’s science education theory. Complicated, yes; impossible, no.

Litterature


