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Theaitetos' Wagon[1]

Theaitetos proposed that we know what a wagon is when we know the parts it is made of.

1. This is one way to read him: if you want to explain to someone what a wagon is (we take it he knows what things are called "wagons") then get hold of a wagon and take it to pieces. Lay the pieces on the ground, in no particular order but close enough to make a good collection to point to, point to it and explain, "There, that's a wagon".
On this reading, Theaitetos does not tell us how to explain, to ourselves or to others, what a wagon is. That is because he does not tell us what a wagon is as distinct from any other thing that is made of the same parts. If a thing really is what it is made of, then a rowboat or a staircase may really be the same thing as what a wagon really is. Besides, the collection made up of the parts of a wagon is itself a thing that really is what it is made of, viz. those same parts. (If you demand of a thing that it can be lifted or moved as one piece, then glue the parts together.)
A wheel is no part of either a rowboat or a staircase. But there are no wheels on the ground. Theaitetos asked us to take them to pieces. He told us that we don't know what a wagon is if we don't know what a wheel is, and that we don't know what a wheel is if we don't take it to pieces and contemplate the collection of its parts (or each part of the collection). And the same for each spoke. Or should we stop at the spokes.

2. But there is another reading of Theaitetos: we know what a wagon is when we know the parts it is made of and how the parts are joined together.
That is, if I want to explain to someone what a wagon is, I take it to pieces, let him study each piece and then show him how to join the pieces together to make a wagon. That is, *I know what a wagon is when I have learnt to make one*.

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[1] This article, or exercise, was written for a seminar on *Things, tools and persons* at Århus University, Denmark, in the autumn of 1966. Professor Justus Hartnack, who had brought what we then called "Oxford philosophy" to Århus, and to Denmark, had been working for some years on the concept of a *person,* together with several of his advanced students. What I tried to do in my own seminar, was to sketch such descriptions and analyses of the world that surrounds our actions in it, our *Umwelt,* that would match the analysis of ourselves as *persons*. The main idea behind our discussions at that seminar, was that of a match between a system and its proper elements. If an *individual* (be it an individual word, number, action, or person (such as e.g. the present mayor of Viborg)) *essentially belongs to a system* (there are neither stray numbers nor stray mayors) then the form of existence that we give the individual must match the form of existence that we give the system, and vice versa. The system must be so described that it can intelligibly accommodate its proper individuals, and the individuals must be so described that they can intelligibly occupy their proper places in their proper system. If the world in which we operate is analysed as a physical system, we ourselves, and our operations in it, must be analysed in physical terms as well, and in such terms only. If we try to work out our conception of ourselves as *persons*, acting with respect to the world surrounding us and with respect to each other, we must also try to work out descriptions or analyses of the-world-within-which-we-act in terms that make it intelligible as a setting for our actions.

We may call any object that is conceived of in terms of its physical predicates only a "material object", and we may let the term "implement" serve as a stand-in for any artifact whose very point (and so the reason for its existence) lies in its place within our system of actions (be it a tool, an instrument, a vehicle, a house, etc.). The pair of concepts *material object* and *implement* is, then, a counterpart to the pair of concepts *bodily movement* and *action*. The two pairs of concepts match each other in the way they enlighten us, and also in the way they confuse us.

2.1 And the same for each one of its parts. But not all parts are made by joining parts together. The spokes may, each of them, have been cut out from the branch of a tree. That is, a spoke may be a least part of a wagon and made out of something that wasn't itself made. The art of joining parts properly may be no part of the art of making spokes, whereas the art of handling a knife may. The size of the spoke, and part of its shape, may have been derived from the size and shape of the wheel. But that should not bother us now. This spoke has already been made, and we know what it is if we know how to make one to match it.

2.1.1 The spoke has been cut with a knife out of a branch of pine. I know what such a spoke is, this spoke and each one of its mates, if I know it can be cut with a knife out of a branch of pine. If I don't know that, then I don't know what such a spoke is either. That is, if I know what can be done with a knife and also know a good deal about what can be made of pine, but don't know that such a spoke can be cut with a knife out of a branch of pine, then I don't know what such a spoke is. I don't need to know all about how it was actually made, but I need to know how it can be made. (Here you must not read "such a spoke" as "a spoke cut with a knife out of a branch of pine", but as, for example, "spoke for such a wheel" which, in turn, may be read as "a spoke for (such a wheel for) such a wagon". But here the circle closes, on our second reading of Theaitetos, since what makes a wagon such or such a wagon, is the parts it is made of and how they are joined together.)
I know what a wagon is if, and only if, I know how one makes such a wagon. To know that, I must know how one makes wheels, and to know that, I must know how one makes spokes. And to know that, I must know how one handles a knife. That is, if I don't know, for example, how one handles a knife, then I don't know what a wagon is either.
Thus one might say that knowledge, or knowledge of some depth, about any made thing presupposes knowledge about, among other things, the tools that are used to make the thing (or the tools that can be used to make *such* a thing). That is, my knowledge about artifact is lacking in depth if my knowledge about the history of its production, or about a possible history of its production, is lacking in depth.
(The city-dwelling teacher of metaphysics may well be satisfied with less, and an examination of what he calls "knowledge" will not teach you to look this far. But it is not the show window concepts of tools and implements that we are after, but those of the craftsman, who not only makes use of his tools and implements, but also looks after them, repairs them when they fail, etc. When my knowledge is lacking, it is *his* knowledge that I lack.)

2.1.2 I don't know what it is to make a spoke by cutting it out of a branch of pine, if I don't know what *cutting something out of something* is. And *the operation* is conceptually tied to *the tool*. I plough with a plough, saw with a saw, cut out with a cutter-out, etc.
Cutting something out of something, with a knife for example, is also tied, conceptually, to *the material* from which something can be cut out with a knife, as for example wood. And since cutting of something is an operation, and operations are conceptually tied to their points, cutting something out of something is also tied to that which gives the operation its point, which is *the product* that the producer is producing.

2.2. "The spoke has been cut out from a branch of pine with a knife". This description is of the form *x has been cut out of y with z*, which in turn is built on the form *to cut x out of y with z*. Inserting "a spoke" for x, "a branch of pine" for y, and "a knife" for z, we can work back to the original description. The three open places in this form are, one for the product, one for

the material, and one for the tool. To investigate the restrictions that hold on the terms that we insert into the three places (what sort of restrictions they are, their mutual interdependence, etc.) is to investigate the conceptual relations between the material, the tool, and the thing made – with respect to the operation of cutting something out of something. (If the concept of the material is the concept of some raw material, then the form demands that one tool shall be enough to complete the transformation from the material to the finished product. A knife is one of the few tools that can occupy such a place).
We may also regard "is cut out from" as an insertion into an open place in a form, and mark the place with e.g. "is transformed from". That gives us a form one step up in the order of formality: *The product x has been transformed from the material y with the tool z*. If, then, we insert "the log" for "the product x", "a pine tree" for "the material y" and "an axe" for "the tool z" we shall find that we have no concept of an operation to insert for "has been transformed from". That is, there is no operation that we conceive of as *one operation* that describes the transformation from tree to log. But we shall also find that we can describe the operation if we apply the form twice, with a different operation concept each time. The two operations are not distinguished, as is often the case, by two different tools being used, but by the different positions of one and the same term. The term operates as a middle term, first to be placed as the product of the operation, and then as its material. I don't know what a felled tree, with the branches still on it, is called in forestry English, other than a "felled tree". But that is the product of the first operation with the axe, the operation of *felling* a tree. And the same thing, the felled tree, is the material of the next operation, that of *lopping it,* or cutting off its branches. And the product of that operation, is the log.
Take this small exercise as a hint of what is in store for us. We cannot get a clear picture of our concepts of operations without working on *the grammar* of such concepts. And we need a clear picture of our concepts of operations to get a clear picture of how artifacts are made and what it takes to make them, that is, of the history of their production.

2.3 Of things that are made, or can be construed as having been made, we can say that we know as much or as little about them as we know about how they were made, or could have been made. To the things that are made, or can be construed as having been made, belong, for example, wagons, roads, shoes, raincoats, houses, towns, board games, ballets, melodies, proofs, formal systems, workshops, social organizations, societies, language games, languages, etc. The concept of *making* is not the same for all of these things, but they are all made in the sense that they all owe their existence to human work. (The making of one thing may imply the making of another. New technologies may imply new forms of organization of work, and the two together may imply new language games. Etc.)
If the world is conceived of as made, or created, we can say that our knowledge of the world is lacking in depth just as much as we lack the ability to make it, or to make it after (as when we make rain or lightning, or build an artificial heart that works). And the depth of one man's knowledge may be measured by what he can make, or make after, of what has already been made. (The man who is able to build his own car has a deeper knowledge of what a car is than the man who only knows how to drive it. And the depth and the character of his knowledge can be measured by what of it he has actually made himself, or would have been able to make himself.)
Some of this has been said already, by *Vico*. And it is the same understanding of what knowledge is that is behind the construction of *generative models*, whether of a grammar or of an economy.

3. Up to this point, we have been arguing within the framework of the thesis that “I know what a made thing x is if I know how x can be made”, which was our second reading of Theaitetos' instruction.
But do I know what a wagon is if I can make a wagon but know nothing of its use?

Let us first find out whether that combination of knowledge and lack of knowledge is possible.

3.1 There are good wagons and bad wagons, and a bad wagon is still a wagon. But if the thing lacks wheels as well as shafts, it isn't a bad wagon, but something else, for example a case. It is not enough that the thing has the right look either, if for example the wheels don't turn or the thing melts when the day gets warm. Even a bad wagon must be able to serve as a wagon to be counted as a bad wagon rather than as a good or bad something else. It must be able to roll, with no more friction than what a horse can endure – for example for half a day. It must be able to carry a heavier load than what a single man can carry with ease. It must be able to roll that lightly thus loaded. Etc. If what you have made cannot be used as a wagon, then what you have made is not a wagon. For the thing to be a wagon, it must be able to be used as a wagon.
The standards for the usability of a thing may change from one household to the other, from one economy to the other, etc. But the standards are drawn from the thing's use, and from its use only.
How large or how small may a wagon be? How long or short may the shafts be? When is there too much friction on the wheels? How much shaking must a wagon be able to take with how heavy a load without going to pieces? Etc. If you cannot answer such questions, you cannot make a wagon either (even if you know the form of each of its parts and the form of their composition (as there is nothing in all this to tell you about either size or material)). To each such question the answer lies in a description of the use of the wagon. The wagon must not be larger than a horse can draw, fully loaded, along the road or on a flat field. The shafts must be long enough to harness the horse. Etc.
In this way, the concepts that we apply to describe the use of a wagon enter into the description of its material, the manner of joining its parts, etc. And if this is the way the wagon-maker explains to his apprentice how to make a wagon, the apprentice will not understand his master’s explanations unless he is familiar with the concepts with which we describe the use of a wagon. “Find out about the normal size of wagons that are used to carry slate on similar terrains”. “Find out about the size of the horse and the manner of harnessing, and then determine the length of the shafts”. Etc. In short, if you don't know how a wagon is used, and what it is used for, you cannot make one either.

3.2 We may say, none the less, that knowing how to make a wagon is one thing, knowing its use another, and we may have either one without the other.
Considering things that are made by machines, or things that it is possible to make by machines, or things, to make which, it is possible to build a machine: for each such thing it is possible for the master to instruct his apprentice how to make the thing without using any concept that cannot enter into a description of how the machine operates. The apprentice can be taught to make any such thing without, for example, being given any knowledge about the material other than the knowledge of the shapes and positions that the machine has been built to react to. The machine cannot, say, distinguish between pine and fir, sort different planks of pine according to their suitability for a given construction, etc., but it can, say, pick and object

from such and such a place and move it into position at some other place, etc. So the apprentice is not asked to find a suitable plank of pine, etc., but to pick a piece from stack C, etc., where the stack is identified, either through some counting procedure or by being marked with the letter 'C' – or in some other way that a machine can tackle. This, then, is the sort of concepts that the apprentice needs in order to understand his master's instructions, and he needs no concept that would have to enter into a description of how the thing is used. His master says nothing about what shafts are, their logical place in the construction, what they must be able to withstand, etc. He tells him to pick two pieces from stack F, cut them to fit template 16, etc. He demonstrates which tools are to be used in what order, which measures must be satisfied before tool 1 is to be replaced by tool 2, tool 2 by tool 3, etc. In this way, the master turns his apprentice into wagon-making machine, whose first operation is to pick a plank from stack C and whose last operation is to roll the finished product into the storage room. The thing is a finished product in the sense that there are no more operations on it in the programme, except for rolling it into the next room. The apprentice has made a wagon, but he has no idea about what it is that he has made.

3.2.1 There is a lot in this story that is essential to the making of this wagon, but which is not a description of the operations of a machine. We talk, for example, of the master and his apprentice, and this relation between the two cannot be understood except in terms of legal or moral concepts. Besides, such relations between two persons as, for example, 'keeping an agreement', 'misunderstanding an instruction', 'asking whether', etc., are of a different category from such relations between a person and a thing (from a person to a thing, that is) as for example 'moving it from place μ to place ß', 'cutting it into two', 'molding it into shape', etc. And it is only some of the relations from persons to things that can be described in machine concepts. Not, for example, that of contemplating the thing, or contemplating it with joy, or giving it away, but, for example, that of cutting it in two, or moving it. It is when the relation from a person to a thing is of the second sort, that it is possible to describe the person in machine terms and the thing as a material object – that is, as an object that can be completely described in terms of the concepts of geometry and mechanics, where the completeness does not consist in there being nothing more to say about it, but in there being nothing more to say about it as thus placed within that relation, that is, as an object being thus operated on, e.g. cut into two.
But the moment we look at the thing of use, not as a material object simpliciter, but as *a thing of use,* be it a tool, a household article, a vehicle, etc., we thereby look at it as being *essentially placed within a set of practices,* where the practices are embodied in what people do and do not do with it, in handling it, repairing it, giving it away, etc. The hammer is essentially for hammering, the knife for cutting, etc., and within a given society these are some of the innermost operations of housebuilding, with planks and nails, of carving wooden articles or gutting newly caught fish, etc. Our concept of a thing of use involves a concept of the use of the thing. And what we call the use of a thing, is a cluster of core operations, cut out from the system of practices in which the thing of use is embedded.

3.2.2 A given material object can also be regarded as a chemical system. If the thing is made of wood, it can also be described as an anatomical structure. Etc. But while we presuppose a degree of solidity, of head and shaft, when we work with the hammer – this presupposition can be read off from our manner of working with it – there need be no presuppositions whatsoever about its chemical constitution or about the anatomical structure of the shaft. So the hammer has been given a complete description as a material object, if it has been given a

complete description in mechanical terms. If there is a chemical description of the hammer, extensionally identical to the mechanical description of it, the chemical description will count as a description of the same material object only *via* its identity to the mechanical description (but not the other way round). And the mechanical description is complete if, and only if, it is complete with respect to the operation of hammering (or: as closed under the concept of hammering).
When we have given a complete description of a hammer as a material object, what is it that is lacking for it to be a complete description of a hammer? If there are no mechanical predicates lacking (when the description is closed under the concept of *hammering*) then there are no physical predicates lacking. The object that we use as a hammer, because that's what it is, is the very same object as the object that we have described completely in mechanical terms. If, therefore, we have made an object that satisfies the mechanical description of a hammer, we have made a hammer. A hammer, therefore, can be made by a machine, and so can a wagon, a chair, a rowboat, etc. And so it is possible to seperate knowledge about how to make a given thing of use from knowledge about its use. We may know the one without knowing the other.

4. Now, a machine is itself a thing of use, and our question about wagons can be repeated for machines, e.g. for machines that have been built to make wagons: do I know what such a machine is if I know how to build one, but know nothing of what it is used for, or, as we say, of what it does?
The problem that we attached to our question about wagons also repeats itself: Is it a possible combination of knowledge and lack of knowledge? That is, is it possible that I, or a team of us, can have the knowledge that is needed to build such a machine, but lack every concept that is needed to describe what it does, that is, since it is a wagon-making machine, what a wagon is, that is, how it is made and what it is used for?
Our arguments from 3.1 and 3.2 apply again, and so does our conclusion: If we can build a machine x' to produce exemplars of machine x, then we can give instructions about how to build x, saying nothing about the work x is being built to do.
There is always a next step on this ladder. We can always design a next machine x^i, and therefore we can always design a set of instructions, in x^i terms only, about how to build machines x^{i-1}. So it is possible to build x^{i-1} with no knowledge of what it does. That shows how much of our industry works.
But in *designing* machine x^i to produce machine x^{i-1}, what defines the task is a set of premisses about the work x^{i-1} is going to do. And the same holds for the task of designing machine x^{i-1}, etc., all the way down the ladder to the machine that builds the wagon, or the truck, or whatever article of use the whole set up is aimed at. The step that must be taken before any other step can be taken, in this series of logical designs, is the design of the article of use, e.g. of the wagon. And the task of designing a wagon is defined by a set of premisses describing its use. This is the first set of premisses in the series, and all the other sets rest on it.
The only (praxeo)logically necessary figure in this story is the wagon-maker who knows how to build a wagon and who knows what it is that he is then building, that is, who knows what it is used for and how it is used. And this figure is most completely, and therefore most beautifully, embodied in the person who is both maker and user, both farmer and wagon-maker, both fisherman and boat-builder, etc. Such people still exist.

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ADDENDUM

There are tools that require the coordinated operation of two agents, with a mutual understanding between the two, not only of what they are doing, but also of when what is to be done. Some of the tools that come in pairs are of this kind, as for example the sledgehammer and the bar, which are used to bore holes in rocks (in preperation for blasting them). This pair, the sledgehammer and the bar, looks like a giant version of more homely pair, the hammer and the nail. But, whereas I position the nail with my left hand, say, and strike it with the hammer in my right, the sledgehammer and the bar require one man each, just because of their size and weight. The analysis of two-person operations of this kind, is quite intricate. Here an operation on some object, such as boring a hole in a rock, is embedded in an interaction between two persons, where the interaction between the two is, in turn, organized with respect to their joint operation on the object.
In such work operations we find what the Germans like to call *subject-object* relations and *subject-subject* relations joined together in one and the same operation (and cases where they are not so joined should be contrued as *derived* cases). The subject of this operation with the sledgehammer and the bar, is a team of two. That is, the subject of this subject-object relation is itself established, and upheld, via a subject-subject relation (between the two in the team) which, in turn, is established and upheld via their seperate and common understanding of the demands of this subject-object relation, the boring of this hole with this pair of tools.
With respect to the operation of boring, this team of two is the one subject of the operation. In decomposing the operation we also decompose its subject, and arrive at the coordinated operation of each of two subjects – or persons. Each of the two operates with respect to the other's operations with respect to the boring of the hole, and this complex, mutual understanding between the two is of a form, or a scheme, that we may call *the dialogical scheme* (which may be just another name for the so-called "subject-subject relation"). Even if their joint operation is executed in silence (as it may well be, if the two of them form an experienced team) it is ripe with speech. There is a lot of addressing one another, and the topic is each time one or another of the contingencies that attatch to their joint operation on the rock, with this pair of tools. But there may be no need to talk.
The concept of *the dialogical scheme* may be illustrated by a set up that deteriorates as the component relations of the scheme are satisfied, and which breaks down completely if they are all satisfied. Let "Sxy" stand for *x is shadowing y,* and consider the following four schemes (the number four is a bit arbitrary, but only because the analysis is a bit sketchy (with a worked out analysis we should be able to assign a definite number to the row of component schemes)):

(1) *Sxy,* which is a genuine article only if y does not know that Sxy (and possible only if x knows that Sxy).
(2) *Sxy & y knows that Sxy, but x does not know that y knows that Sxy* (that is, x takes the situation to be that of (1)).
(3) *Sxy & y knows that Sxy & x knows that y knows that Sxy, but y does not know that x knows that y knows that Sxy* (and x knows that this is the situation, whereas y takes it to be that of (2)).
(4) *Sxy & y knows that Sxy & x knows that y knows that Sxy & y knows that x knows that y knows that Sxy* (and x knows that this is the situation).

This is a simplified version of the story of how Sxy breaks down, since we have omitted all the steps where x or y wonders *whether* y or x knows that so-and-so. Also, it is only the scheme of a story, and not a genuine story, since we have not described how the transformations from step n to step n+1 takes place, or how x or y detects that it has taken place.

Sxy, even in its most deficient mode, is inconsistent with (4). But if we let x and y converse each other, or cooperate in some other way, and write Cxy for that, then Cxy entails (4), when S is replaced by C. That is, the genuine case of Cxy does. Where lapsing is possible, it is always possible for the conversation or the cooperation to deteriorate into one or another of its deficient modes, with (4) not holding.

There are some very definite dangers attatched to boring with bar and sledgehammer, in particular to the party holding the bar. Both x, holding the bar, and y, operating the sledgehammer know about these risks, that is, x knows them, y knows them, x knows that y knows them, y knows that x knows them, y knows that x knows that y knows them and x knows that y knows that x knows them. And this is (4) again. Cross out the last two components and x and y may still be boring, but in a deficient mode of cooperation. The lack of either of the last two components may occasion some false manoeuvres and cause great harm. ("I thought you knew that I knew it".)

As it stands, this note should be read as a series of conjectures. To prove my case, I would have to work out genuine stories, exhibiting some definite shift in the situation between the two from each step to the next. On the basis of my explorations with the Sxy story, I hold that that story is completed with (4). You can always go on iterating, but no further iteration will result in a new dealing of the cards.

(Added 2009): As for the title of this article, and its first sentence, it was Socrates, quoting Hesiod, who proposed that we know what a wagon is when we know each of its different parts. But whereas Socrates only proposed it as a theory that should be considered, Thaitetos accepted it at once and in that sense made it his own – if only for a while. That is why I let Theaitos have the wagon, not Socrates and not Hesiod. (The wagon-example is discussed in Plato's *Theaetetus* 207 and 208.)