

# Measure, machine, money

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## Abstract

The aim of the text is to clarify why machines are economically productive only in capitalism and therefore in our society are capitalistic machines. They are capitalist not only because they increase the productive power of the capitalist valorisation, but this valorisation first of all is producing these machines, or at least it produces their productivity and hence ‘the machinic’ of machines. To understand this production of the machinic, we must understand them, as, for example, Heidegger, Simondon or Deleuze and Guattari have shown, from their context: From their non-technical essence, from their connection with other machines and from the social essence of the machinic. But in this context, first of all and in the last instance, we have to understand with Marx their entanglement with the capitalist valorisation. This can be shown for three different types of machines: The physical machine, the calculation machine and the social machine: Money. What all three have in common and almost defines them as machines is that all three naturalise relations by quantifying them. The classical physical machine quantifies the relation of nature, the calculation machine quantifies information and meaning, and the money machine quantifies the relations of our society. I will concentrate on the physical and the money machine only. The technique to quantify is for both the same: Measurement. This quantification and naturalisation by measurement is why both are – although or especially because they are opposed types of machines – interfaces to the capitalist valorisation process, and in this functioning as interfaces, we have to search their non-technical essence.

## Keywords

money, machine, measure, technique, quantification

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## Introduction: Inside the natures of the machinic

Machines are productive as they constitute three natures, the same three natures they identify:

1. The first is the 'natural' nature, which is constituted by the measurement and the 'Weltbild' of the new scientific vision which forms the experiences of modern science. Here the experiment is already the prototype of a machine. It is an inverse machine, as it experiences properties of a nature that science can formalise and reproduce in knowledge and theory, and these formalised properties then can be inscribed by 'extroverted' physical machines in the production process to reproduce the identified properties in a practical manner.
2. The second nature is the social nature constituted by the money machine. 'Second nature' was already used by Hegel for the freedom of a Spirit who knows the necessities of first nature, sublating thereby the difference to nature's necessities in the building of its own realm (Hegel 2001: 28, 136, 205). Marx and Critical Theory (Adorno 1973: 300–360) brought in a new determination and a kind of materialist turn, as now second nature is thought in analogy or homology to the necessities of first nature and addressed as a pure social nature, a social nature which has this status by its quantitative and specific capitalist nature.
3. With the calculation machine and the production of meaning by the processing of (big) data, programming and algorithms, there is now a kind of third nature, confirming under names like virtual reality, artificial intelligence or digital capitalism.

All these machines are not only productive as they constitute what they at once identify and process, bringing forward three different natures. They are by this 'naturalisation' of three different natures productive as a *social power* as all three, despite their differences, in itself, as machines, control homogenised energy for determined ends. This naturalisation by socialisation and vice versa they do on the level of a capitalist and biopolitical formalisation, control and organisation. They are the social power to homogenise, formalise and integrate individuals into classes, masses, populations and at once structure and differentiate them for determined ends. This socialisation is the quasi-natural energy or the power that these machines at once control and determine.

The aim of this text is to clarify this 'machinic' of machines. To be precise, the aim is to show why machines are productive in *capitalism* and therefore *capitalistic* machines. I want to show that they are capitalist in the immediate and literal sense that they are productive only in the capitalist mode of production, namely, only by a *quantitative valorisation*, and this mode of production is *also producing these machines*, or at least capitalism is producing their productivity and hence the 'machinic' of machines.

This is a radicalisation of an issue already elaborated in technique philosophy. In capitalisms, machines become specific capitalist machines simply because, as, for example, Heidegger (1977), Simondon (1980) and Deleuze and Guattari (1983) have shown, we must understand the machine from its context: From the non-technical essence, from the connection with other machines and from the social essence of the machinic. And in

capitalism, this context, first of all and in the last instance, is the relation with capitalist valorisation and its productivity.

In reference to the three natures, this capitalist determination could be shown for three types of machines: For the physical machine, the calculation machine, and for the social machine, money. What all three have in common and what almost defines them as machines is that all three set *quantification in power*. The classical physical machine converts quantified relations of nature into practical ends, the calculation machine converts quantified information into meaning, and the money machine quantifies the same social relations it mediates and valorises.

To shorten and facilitate, I will concentrate here on the physical machine and on the money machine only. The advantage is that by opposing these two machines, we can show exactly their social and capitalist origin, because they both emerge from the radical separation of our modern-capitalist society in nature and society.

Hence, to show the capitalist context of machines, we must start with this separation of nature and society; this will be the first step. The separation already leads to the second step, because the separation not only constitutes both nature and society. Decisive is rather *how*, in which way, these two 'objects' are separated and at once *given*. How they are separated and given defines already the whole status of these 'objects', namely, the concept of objectivity itself: Both are given by their *quantification*. This quantification is again already entangled with a third step: The separation in nature and society is practical when both become quantified by *measurement*. This measurement finally leads to the forth and last step: The measurement already is an interface between the measure and its object, and this interface is the prototype of a machine. Therefore, the last step will be to show that machines occupy the quantification of nature and of society, being their interface in the capitalist valorisation process.

We can combine all these steps: The separation, the quantification by a measure and the machine as an interface, as *technique* (Engster 2016; Engster & Schröder 2014). To understand the capitalist character all kinds of machines share, we have to understand this technique of quantifying by measurement.

### *The separation of nature and society and the idea of objectivity*

Before there can be a quantification of natural or social relations and before a machine can set this quantification in power, nature and society must become first of all an *object*. My thesis is that their objectivity grounds in the negativity or in the negative essence that emerges from their radical separation. To separate nature and society sounds quite simple, but this radical separation distinguishes our modern illuminated capitalist society from all previous societies and brings forth the whole idea of nature and of society and the modern paradigm of object-subject (Engster 2014). This is because by the radical separation, both nature and society for the first time are exposed to nothing than itself. Exposed means that, on one hand, nature must be determined totally by itself, by its inner necessity and by its own laws, abandoned by all gods and higher beings. This leads to the tautology that nature must be determined by its identity or its own nature. And, on the other hand, the same goes for society. Society too must be determined by nothing other than itself, without any gods or higher beings or destinies. The illuminated society

is confronted with the necessity to find its destiny out of itself and give itself its own laws by reason. Therefore, the real separation is that both nature and society are liberated from their 'common excluded third', from any connection to a god, to higher beings or an external destiny, and by this, both are exposed to nothing then themselves. This separation and exposure is already a technic insofar as it gives both modern illuminated concepts or ideas that of nature and that of our actual society.

The separation thus takes on a specific modern form, and there is a perfect German term to name this form. It is 'Gegenständlichkeit'. *Gegenständlichkeit* means to oppose nature and society or, in a similar sense, object and subject and further experience and consciousness. By nothing more than the separation, we already have these specific modern paradigms.

But if we take a closer look, the separation must be always already *sublated* in these two objects; the separation must already have taken on the *form* of nature and society and determines their content. More precisely, it is the *negativity* of the separation that not only first of all 'opens up' nature and society and opposes them, but the negativity has already turned into something positive on both sides. Therefore, the real task is to understand the negativity ever sublated in nature and society, sublated in a way that both must be determined by nothing other than itself.

In the case of nature, this is the task of natural science that means science in the modern sense that determines nature in an exact and quantitative way like, first and foremost, physics. Natural science has to detect how nature in a negative way, without any supra-individual god and by abstracting from any individual subjectivity, is determined by nothing other than itself. Meanwhile in the case of society, the understanding of how our society determines itself, hence our self-understanding, falls into philosophy and critique. Historically, this started with illumination and the philosophy of German Idealism, but this philosophical self-understanding was then in a materialist way turned from 'head to feet' and 'socialized' in Marx' (1976) critique of the political economy and its categories (p. 102).

But whether the object is nature or society, in both cases the object is *objectivity itself*. Nature science has to deal with an objectivity that consists in the as unconscious as objective self-relation of nature, and also the self-understanding of society has to deal with an objectivity that is a self-relation. But here, the self-relation becomes determined by subjects, and these subjects not only are subjects because they are aware of their social relations, the subjects are also aware of nature's self-relations, nature's *unconscious* self-relation – just as if the Enlightenment of society also enlightens nature about itself.

### *Quantification as turning negativity into being*

However we understand this *self-relation* of nature and society, we see now why already their radical separation is a proper technique: Because the technique to separate is to constitute two objects and their objectivity. Already by their separation alone, the whole idea of nature, a whole 'world view', as Heidegger (1977) puts it, is given, the word view with which modern nature science and with which the illumination of society starts. It is given negatively and in the strong sense of an anonymous, one-sided gift or 'Es gibt', as the same Heidegger has put it and Derrida (1992, 1996) had taken over and further developed it in his ethical writings and in his idea of a 'gift'.

To identify what in this negative way is given and must be a self-relation leads to the second step. It seems to be just as simple as the separation: To identify the self-relation of nature and society, to identify their in the Kantian sense ‘empirical pure’ being (Kant 1998 [1781], A 20: 156) or, as Hegel (1969) has developed it in his *Science of Logic*, to identify a ‘pure being’ that is determined by nothing than itself and a negative essence, the self-relation must be turned *as such*, as a negative being, into positivity. This turn is *quantification*: By quantifying the relations of nature and of the society, both self-relations and both negative beings are turned into the positivity of magnitudes, and the objectivity of nature and of society is given by this tuning.

But to turn the negativity into a quantitative being and ‘to give’ by this turn objectivity, again a technique is needed. This technique is the same as the separation, but now this separation becomes practical, namely, in the technique of *measurement*. The technique of measurement is to turn the self-relations of nature and of society into a quantitative being and hence force their self-relations to appear.

That the separation becomes practical in measurement already can be shown if we understand how *a measure is given*. If we understand how a measure is given, we see at once the constitution of its object and the technique to turn it into the objectivity of its pure quantitative being.

### *The measure and the technique of quantification*

Let us first look at how a measure is given in natural science. The first and already decisive point is: Modern natural science neither holds nature to supra-individual, divine norms or rules nor to subjective feelings or experiences, perceptions or concepts. Natural science rather extracts the measures from the same nature it makes by this extraction first of all an object of measurement. This extraction and exclusion of a measure from the same nature which by this first of all can become an object of objective determination must seem to be as paradoxical as tautological, as nature is being held onto its own measures and forced to determine itself. However, in this situation of reciprocal setting of preconditions, the measure is already *practical*, because on the one hand it is extracted from nature itself, but on the other hand, this nature becomes an object measured by a specific part of itself. Science extracts for example the second from time or the meter from space (or parts or multiples of it) to fix them as a specific quantum that counts like a measure, and at once science uses these extracted measures to hold time or space onto their own measures and to ‘break’ them through their own measures.

This break is what turns the relations of nature as such, as a negative being or an unconscious self-relation, into the positivity of *quantitative* relations. We can bring the whole technique (1) breaking nature through its own measures, (2) turning its relation into a quantitative being and (3) bringing objectivity into appearance, to one precise and striking term: *Reflection*. The measurement is a kind of reflection of nature, and consequently, this reflection realises and identifies nature.

But we have to be aware of the crucial point here. Natural science does *not* reflect on nature as if it is given like an external object – but the measure does so. Natural science must organise with measures nature’s *self-reflection*; it must hence organise that nature is

broken through its own measures and turns its self-relation into quantitative relations, like in an as unconscious as objective self-reflection.

Consequently, in the measured magnitudes nature is always already given in a reflected way. These magnitudes are not nature itself, but they *correspond* to it; it is as if nature by this unconscious self-reflection comes to consciousness separated from itself in its own other, in the subject of knowledge and in natural science. Here, nature's identity is identified by the measured magnitudes, and these magnitudes then can be formalised and formulated as nature's laws and represented in knowledge, yet with the measured magnitudes, nature can even be calculated. In short, measurement is how nature's self-reflection gets objectified, and this objectivity is given by magnitudes to a subject which in turn becomes a subject of knowledge.

The same technique of measure is essential for social objectivity and decisive in determining our social relations. In the case of society, the measure is *money*. Marx shows in his famous value-form analysis right at the beginning of *Capital Vol. I* how a measure is given. It is given by the same logic explained for the measure in natural science, namely, by a practical exclusion of a part from what in turn becomes the object to be determined. This exclusion, Marx' value form analysis shows, concerns a commodity which becomes the measure for all other commodities and set them in a pure quantitative being. This is because by its exclusion, an *ideal value-unit* gets fixed, and by this fixation, the excluded commodity becomes the 'money-commodity', while all the other commodities become its object and are set in a quantitative relation as pure values (Marx 1976: 125ff.). In short, related to money, all commodities share an ideal value unit as their common measure. They share it in a quantitative way, and this sharing falls into the practical realisation of their relation in the exchange process.

We will come back to this exchange process and the practical social form of measurement or better self-measurement later on. What is decisive for now is that we see here the same technique as in natural science. Like science holds nature onto its own measures, also society by money is held onto its own measure. And also here, empirical pure and as such negative relations are turned into quantitative relations like in a kind of reflection or better self-reflection – in this case not a self-reflection of nature, but of society. And finally, also here in the measured values, the society is always already given in a *reflected* way and the magnitudes must correspond to a measured social objectivity.<sup>1</sup> Therefore, when we deal with values and quanta everyday, these quanta are already a result of a measurement, and we are simply measuring using money.

Consequently, also the quantified social relations lead to a kind formalisation, a formalisation of the social. According to Marx, all qualitative beings of the economy: Labour, commodities and means and conditions of production, have a double character. They are qualitative concrete and particular use values, but they count as pure, non-empirical magnitudes – and to count them as magnitudes and to set them in a quantitative relation is what money does. Therefore, by money their qualitative properties can, whatever they might be, process in the form of pure quanta and becomes valorised.

We see that the technique to 'turn into quantity' is the same in both nature and society, namely, to *give* objectivity in a strong constitutive sense and, even more, to *naturalise* this objectivity in a first nature and a second, pure social nature.

But here, we have also the decisive *difference* between first and second nature. While nature science must take the magnitudes as the relation of an already existing, quasi external nature, the magnitudes money realises are a social relation that by this quantification first of all gets real – money constitutes and even produces the same second, social nature that it at once realises (even though, or precisely *because* this social nature appears in the way it seems to exist *without* money). Consequently, the formalisation of the quantitative relations does not fall into knowledge, like it is the case in nature science, at least not at first. It first of all falls into the value, the economic flows and the circles of money. It is as if money by its value, its flows and circles is in knowledge of the same social objectivity it mediates, and as if money by this mediation of social objectivity becomes a supra-individual, automatic subject that replaces the subject of knowledge we have in natural science (or we have in Hegel's supra-individual Spirit).

With this technique of quantification and this production of a first and second nature, we reach our final step. After the technique to bring nature and society by measurement and quantification into a self-reflection by which their objectivity is given, we have to look how this technique becomes machinic.

### *Measuring-process as a prototype of a machine and machines as an interface*

Let us start with the physical machine. We have seen that natural science 'takes' the measures out of nature itself to, on one hand, separate and fix them and hold them identical, and to, on the other hand, hold nature onto its on measures; by this paradoxical and at once tautological entanglement, the relations of nature are turned into a quantitative being. Therefore, instead of being a subjective reflection on nature, science organises nature's self-reflection to identify the properties of nature by the measured magnitudes. Science subtracts itself as the subject of knowledge, but in a way that it seems as if nature comes to itself, to its own consciousness, separated from itself, forced to appear by measured magnitudes.

In this unconscious self-reflection of nature, we already have the idea of its practical use: That the self-reflection becomes practical when nature is directed against itself, so that its properties affect itself and 'work' on itself. Therefore, the measurement process, especially the experiment, is already the idea or the blueprint of a machine and even of the capitalist production process in total, and this idea only has to be implemented in the production process: To organise the production process like a *natural process*. But in nature science, this production remains a theoretical formalisation and calculation with nature's properties and laws. The identification remains pure quantitative, and it leads to a formalisation that remains a pure theoretical reproduction of nature's properties. To become practical, the properties must be inscribed into the production process which reproduce them in a practical manner. And this is where machines as means of production come in: To reproduce the properties of nature in a practical way, the quantification must be set in power by machines. Science and theory become economically productive only when they are converted into a practical metabolism by machines, making science, theory, and machines an interface between nature and society. Therefore, if the

measurement already is a kind of nature's self-reflection, this self-reflection becomes a practical self-*application* when machines make sure that the properties of nature are forced to work on themselves.

Consequently, this self-application produces a subject of *production* instead of a subject of knowledge. While the knowledge production by measurement in natural science produces the subject of knowledge, but a subtracted one, the machinic production too produces a subject of production, and it is in a similar way separated. Both subjects are exposed from the production itself, be it the scientific production of knowledge and theory or be it the material production, and both subjects are set apart by the same technique: Like the subject of knowledge stands apart and is just organising and controlling nature's self-reflection, likewise the worker in the capitalist production process stands apart from the production process by organising and controlling a kind of nature's self-application that machines do for him. (This turn of nature against itself that Hegel already has thematised as 'cunning of reason' and a kind of fraud on nature, Marx (1973) has conceived not only as the productive per se but also as the transition to a post-capitalist society: The worker 'steps to the side of the production process instead of being its chief actor' (p .705).)

But here, we again have to be aware of the crucial point. What is inscribed in machines and practically reproduced in the production process are not just the results of scientific knowledge production or the quantified properties of nature, but it is the *technique* of knowledge production itself that becomes practical in machines, and it is the technique of measurement that becomes a machine. The measurement—especially the experiment, the measuring device and the formalisation of the measured magnitudes—is the prototype of a machine or an 'inverted' machine. Therefore, the actual knowledge of science is not knowledge *about* nature, the actual knowledge already concerns the technique to *produce* this knowledge.

To fulfil the analogy between measuring nature and society, the next question must be: When the self-measuring of nature becomes machinic in capitalist mode of production, how also the self-measurement of society that money does becomes machinic?

We saw that in the case of nature, its measurement already is the prototype of a machine; what is the identification by measurement and reproduction of nature's identity in *theory* becomes *practical* when inscribed in machines to reproduce these identified properties of nature in a form of self-application. The same goes for the self-measurement of social relations by money. Money becomes a machine or machinic, when money not only measures the social relations of the commodities but when it also inscribes the measured magnitudes back into their production. More precise, it inscribes the realised magnitudes into the *elements of the valorisation in commodity production*, namely, into labour and capital, giving them both a double character as qualitative properties with a pure quantitative value, leading to a material production that is at once a pure quantitative valorisation and accumulation. Marx (1976) calls the qualitative side of the valorisation the 'technical composition' and the quantitative side the 'value-composition', both combined are the 'organic composition of capital' (Chapter 25).

When money, like described so far, turns the social relations of commodities into quantitative relations, this 'simple turn' is always already overtaken by the overarching capital form of money. While money as a measure and means of exchange 'only' measures

and constitutes society's self-reflection, which is present in the value relation of things, this self-reflection becomes practical, self-referential and machinic in the capital-form of money and the valorisation process. What above therefore solely was described as the moment of measurement: To turn the relations of commodities into quantitative relations, turns out to be the moment of the quantitative turn-over of money itself. Money hence measures in the commodities not only the productive valorisation of labour and capital, it measures the results of a valorisation money *itself* has been converted to, and in which it will turn back after the realisation. Moreover, by this form of measurement, it determines the magnitudes decisive for the productive valorisation of labour and capital and hence for their reproduction and for money's own accumulation. In short, when money in its capital-form underwent the whole valorisation process an automatised measurement, it also measures – itself. Marx (1976) formalises this form of self-measurement 'Money-Commodity-more Money', M-C-M (p. 247ff.).

### *Money as the time-machine*

The technical aspect of a machine is by common definition that it converts homogeneous energy and power flows in a controlled and purposeful manner. This resembles the 'technical' that Friedrich Kittler (1996) has regularly claimed for media: 'Transmission, storage and processing of information'. But surprisingly, it has not been noticed that this technical of the machine and of the media corresponds precisely to the three main functions of money Marx develops in *Capital* Vol. I: (1) measure of value; (2) means of realisation, transmission and circulation; and (3) form of capitalist valorisation and processing of values. Therefore, if we take all three main functions of money together, we can combine it to a technique that functions really and literally like a machine, the social machine per se.

To develop money as this social machine requires to develop the technique to quantify and valorise labour and capital as an 'economy of time' (Marx). Marx translates labour and capital into two time relations, both productive for their own reproduction in a proper economy of temporalisation by valorisation. The first time relation is past and present labour-time, embodied, on the one hand, in the commodified labour-time of a worker and, on the other hand, in the forms of capital and accumulated in its value. And this relation between past and present of labour-time sets in power a second time relation between necessary and surplus labour-time (Marx 1976: 447ff., 520ff., 559ff.).

Or rather, it is not Marx who translates quantitative relations in these two time relations, he rather shows that money's functions do so; yet, money *is* this conversion or translation of quantitative relations into time-relations and vice versa. By the conversion of quantitative relations in time-relations and vice versa, money like the physical machine becomes an interface and that even in a double sense. The first interface is between what seems to be a natural physical time which by money becomes the measure for a pure social relation and valorisation and its productivity. In the measurement that money does, what must be taken as a *natural* time enters always already quantified as a *socialised* time. The capitalist valorisation becomes with money's functions and money's capital undertaken a measurement by which the valorisation appears in the realised magnitudes of the commodities not only quantified, but reflected through a naturalised time, and in the course of this entanglement of naturalised and socialised time emerges the *historical* dimension of time.

This historical time is the second interface money stands for, as money becomes the passage between past and future of capitalist society, being their presence and presentation. The same quantification that converts physical-natural time into socialised time, the same quantification actualises and presents the productive power of the *past* valorisation, and the quanta present in money can be converted back into the elements of a *future* valorisation. The productive power of labour and capital, hence of the relation of past and present and of necessary and surplus labour-time, remains in power because money, by realising the results of these time-relations, holds this power in time identical or timeless in specific quanta. Moreover, it also converts this time-relation which is stored in its own value back into the forms of labour and capital in commodity production, just like Marx formalises it in the capital-form M-C-M.

After having outlined money as the time-machine which processes our social time relations, the next step would be to show how physical and calculation machines enter in this time relation. This would show why machines in capitalism are productive at all, because they are *not*, as it seems, productive just because we can produce more or better goods. Machines are also not productive as an interface for the metabolism between nature and society. They are productive because they enter in the relation between necessary and surplus labour-time, and here, they are entangled with the social machine money which is the interface for the metabolism with the second, social nature. More precisely, machines convert necessary into surplus-labour time and increase the productivity of the two time relations money process. It is important that machines are productive because they *convert*. They are not productive by simply reducing labour time and, by this, reducing the values of the commodities, they are rather productive by *converting* this reduced labour time into surplus-time, reducing by the values of the commodities the production and reproduction costs of the *one and only productive* commodity, namely the commodity labour power itself. Consequently, machines are not producing material wealth, at least not at first. They produce wealth in the form of necessary time converted in quantified surplus labour-time (Bahr 1983: 388ff.; Marx 1976: 1024, 1987: 83ff.).

### *The non-technical of machines and technique*

We finally see the 'non-technical essence' of machines that Heidegger ontologised and that with Marx can be understood as the 'pure social essence' of the machinic and of technique as well. Machines and technique existed before capitalism, but they had a totally different social essence. They were interfaces between a totally different, non-capitalist society and a totally different understanding and practical use of nature. Above all, they were not productive for the capitalist time-relation and an economy of time. They were mainly, on the one hand, war machines, productive in their destructive use and, on the other hand, they were machines for enjoyment, and they still entered in the medieval craftsmanship as instruments to build, for example, churches. But all these machines could not enter as constant capital into a valorisation-process to convert necessary into surplus labour-time. Only in capitalism, measurement and quantification lead to the self-reflection of both nature and society, and only in capitalism machines become interfaces of a quantified first and a quantified second, pure social nature. Hence only in capitalism, this interface can become the essence to produce and develop machines and technology

adequate to increase the productivity of the time relations in power in the capitalist valorisation process. It is this interface, this essence and this increase of time relations that 'produce' technique and machines, or which already *is* the non-technological and non-machinic, pure social essence in need and search for an incarnation and an embodiment.

This non-technical is first of all and 'in the last instance' the pure social essence which the capitalist functions of money process by measuring and quantifying social relations, setting free the time-relations in power in the forms of labour and capital. The capitalist mode of production is a valorisation process that measures itself by the functions and by the capital form of money like in an automatic and reflexive processes. Thereby, the society enters in a self-relation that is given by pure magnitudes, but we must understand these magnitudes as society's own time-relation, and in capitalism the technique to measure and quantify becomes machinic and increases the productive power of this time relations.

### Author's Note

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### Note

1. Hegel's (1969) 'Logic of Being' in his *Science of Logic* develops exactly this notion of objectivity: That being held on nothing than itself turns its relations by an inner necessity into quantitative relations, becoming decisive for itself. This turn of qualitative relations into quantitative relations must be reflected like an objective self-reflection. The same logic could be shown with Badiou (2006), who however develops the logic of quantification and measurement with his ontological use of set-theory.

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### **Author biography**

Frank Engster wrote his PhD thesis on the subject of time, money and measure and was subsequently a junior fellow at the Post-Wachstumskolleg (Degrow-College) in Jena. He works for several political institutions and foundations and is active in political groups in Berlin. His areas of interest lie in the different readings of Marx's critique of the political economy and especially in money as a technic and its connection with measurement, quantification, time and (natural) science.