

Facts, truth and objectivity today.

Intro

First of all, I would like to thank Odysseus Panopoulos for the invitation to come here to Salamanca. It is an honour and a pleasure to be given the opportunity to speak in front of such an accomplished audience. And moreover, to speak on things that concern us all in academia today, no matter if we are natural- or social scientists, or if our domain is the humanities or the arts.

I say this confidently, because my topic today concerns how we in academia can safeguard ideas of facts, truth and objectivity in an era that seems to be taken over by the conviction that nothing is stable, nothing is reliable and that knowing amounts to nothing more than having an opinion.

In my own research in the field of epistemology, I have tried to articulate how it is possible both to pay heed to the very fundamental critiques that were directed against rationality, intentionality, objectivity and truth in the 20th century, and still preserve a place for knowledge, facts and truths within the sciences today (and here I use the term science in its most inclusive sense, encompassing not only natural- and social sciences, but the humanities and research in the fine arts as well).

In a nutshell, my argument is that even though we have to accept that all our human knowledge is just that – I mean human – such a relativisation does *not* mean, not at all, that we have to abandon objectivity, knowing and truth in favour of some kind of rampant relativism or post factual condition.

To spell this out a bit more, I will first say a few words about my own approach to epistemology, then articulate this approach further by presenting some crucial points made by the microbiologist and epistemologist Ludwig Fleck and by the political and

social thinker Cornelius Castoriadis respectively, and finally I will sum up the consequences of my approach for how we may deal with knowing and knowledge claims today.

1

What did I mean, a moment ago, when I emphasised that our knowledge is *human* knowledge? As if any one here would doubt such a statement – of course knowledge is formulated in different languages, used, conceived and perfected by us human beings. And in this sense it is obviously human.

But I claim more than that. Even the content of our knowledge is inevitably related to us humans, to our specific capacities and embodiment – and since I am a rhetorician by trade, I base this claim in the Greek antiquity, in the platonic distinction between *episteme* and *doxa*.

The sophist Protagoras was perhaps the first in the history of western thought to assume what I would call a doxological – as opposed to epistemological – position, meaning that he choose human imperfection, fluctuating belief and unforeseeable change instead of platonic immobility and certainty. His most famous dictum, the so called *homo mensura*-fragment, is perhaps the most poignant expression of this position:

Of all things the measure is Man, of the things that are, that they are; and of the things that are not, that they are not.¹

We learn from Protagoras that no apprehension, not even of nature or other animals, escapes the antropomorphic conditions of knowledge alluded to in the fragment. For instance, that our knowledge is always formulated and/or preserved in some language, institution or ritual; it is practised and upheld by one or many individuals, always in one historical moment or other and within the admittedly diffuse framework of an ever changing but still specific social situation. All these factors are co-determining our knowledge, making it a part of a fluctuating, always changing doxic situation.

Thus, one should avoid the term 'epistemology' when talking about a human conception of knowledge. Through its entrenched meaning, the term epistemology carries and propagates a conception of knowledge is at odds with the perspective I try to outline here:

Ancient philosophy, at least in its different platonic versions, saw true knowledge (*epistme*) as a result of a direct insight (*theoria*) into how the world *is*. Thus epistemic knowledge supposedly gives access to reality, independent of man.

Ancient rhetoric, on the other hand, saw knowledge as inseparably linked with *doxa* – that is, roughly, what is held to be true, what is believed and what is taken for granted within a larger or smaller group of people. *Doxa* does not reveal reality as it is in itself, but as it appears to us, being the kinds of beings that we are, with the kind of perceptual organs that we possess. Doxic knowledge present us with an eminently human world, not least since it is through our embodied *logos* that we have shaped the *doxa* that presents the world just as it appears to us.

So, rather than calling the rhetorical, protagorean view of knowledge an 'epistemology' or a 'theory of knowledge', I would like to name it *doxology* - a term that the 17th century philosopher Leibniz once used to designate 'a way of speaking that adjusts itself to appearance, to opinions or to practice'.² But I would like to avoid the somewhat pejorative undertones in Leibniz' characterization, and present doxology, not as a teaching about apparent or illusory knowledge, but as a *teaching about situated, objective and relevant knowledge*.

Thus doxic knowledge makes no claim to be eternal or unchangeable – doxic knowledge it is always knowledge in a social and historical situation. It is, as the philosopher and scientist Donna Haraway would say, *situated*. It is made up of what is thought to be evident and true in specific contexts, as well as of belief in facts and values prevailing in a certain society, a certain group, a certain discipline at a certain time.³ It is made up of a social consensus about what is and what should be the case.

But how, should one ask, is such a consensus to be conceived within the sciences?

A pertinent answer to this question is given in the works of Ludwik Fleck: he claims that the objectivity of scientific knowledge is dependent on at least three different factors: thought collective, thought style and what he calls active and passive connections.

In a book written already in 1935 – *Genesis and Development of a Scientific Fact* [*Entstehung und Entwicklung einer Wissenschaftlichen Tatsache. Einführung in die Lehre von Denkstil und Denkkollektiv*]⁴ –Fleck presents what was to become the dominating perspective on knowledge and knowledge-formation in the humanities and the social sciences towards the end of the last century. As an immediate forerunner to Thomas Kuhn and his notion of paradigm and, in a more indirect way, to Michel Foucault and his thoughts about objects of knowledge as being products of discourses and ‘discursive formations’, Fleck stands out as one of the most important thinkers within the modern field of epistemology and theory of science.⁵

In his ‘comparative epistemology’, Fleck does *not* envisage knowledge as a simple relation between an individual seeking to know, and an object about which the individual has or wants to have knowledge. That is, he does *not* conceive of knowledge in terms of a dual relation of the type ‘A knows that P’. He presents his position in the following manner:

In comparative epistemology, cognition must not be construed as only a dual relationship between the knowing subject and the object to be known. The existing fund of knowledge must be a third party in this relation as a basic factor of all new knowledge. /.../. What is already known influences the particular method of cognition; and cognition, in turn, enlarges, renews, and gives fresh meaning to what is already known.

Cognition is therefore not an individual process of any theoretical ‘particular consciousness’. Rather it is the result of a social activity, since the existing stock of knowledge exceeds the range available to any one individual.⁶

Thus, Fleck understands knowledge neither as just an individual, nor as an exclusively social phenomenon. Knowledge is always the outcome of a process involving three factors: the *individual* looking for knowledge; the social, historical, practical and discursive doxic *situation* and the *object* about which knowledge is sought.⁷

Compared to Protagoras, Fleck has more precise conceptual tools to work with. Where the old sophist had recourse to the somewhat crude distinction between *doxa* and *episteme*, Fleck is able to be far more specific and nuanced – as here, where he presents the difference between experimentation and experience:

Whereas an experiment can be interpreted in terms of a simple question and answer, experience must be understood as a complex state of intellectual training based upon the interaction involving the knower, that which he already knows, and that which he has yet to learn. The acquisition of physical and psychological skills, the amassing of a certain number of observations and experiments, the ability to mould concepts, however, introduces all kinds of factors that cannot be regulated by formal logic. Indeed, such interactions as those mentioned prohibit any systematic treatment of the cognitive process.⁸

Among the conceptual tools developed by Fleck to conduct his investigation of cognition the most important are the concepts ‘thought collective’, ‘thought style’ and ‘active- and passive connections’.

A thought style distinguishes and demarcates a thought collective, which in turn is the basis for the style, since the style is borne by the collective. Can we really learn anything from such an obvious conceptual circle?

Yes, I believe we most definitely can. This circularity highlights both the discursive-historical (the style) and the social-historical (the collective) aspects of our knowledge, as well as the fact that these aspects are inextricably united. In short– the circularity shows us just how immanent our epistemological position is, has ever been and will always be. In Fleck’s words:

Like any style, the thought style also consists of a certain mood and of the performance by which it is realised. A mood has two closely connected aspects: readiness both for selective feeling and for correspondingly directed action. It creates the expressions appropriate to it, such as religion, science, art, customs, or war, depending in each case on the prevalence of certain collective motives and the collective means applied. We can therefore *define thought style as* [the readiness for] *directed perception, with corresponding mental and objective assimilation of what has been so perceived*. It is characterized by common features in the problems of interest to a thought collective, by the judgements which the thought collective consider evident and by the methods which it applies as a means of cognition. The thought style may also be accompanied by a technical and literary style characteristic of the given system of knowledge.⁹

For each thought style, certain epistemic relations appear as *passive*. That is, as given, evident, as facts that ‘simply are there’, as ‘real’. Other connections appear as *active*, that is as more or less conventional results of man’s strivings to understand and comprehend:

Once a point of departure has been chosen, once a hypothesis or a certain axiom is considered as true or at least probable, then a certain ‘amount’ of ‘other’ knowledge will follow. And this knowledge, which is always relative to a specific situation, tradition or discipline – tends to present itself to us in guise of objectivity and evidence. The active moment that is *always present in every act of cognition* is, as it were, repressed. Thus, we remain, most of the time, ignorant of how active and creative our cognition really is.¹⁰

Fleck writes in his preface that we are, “... no longer conscious of our own participation in perception. Instead, we feel a complete passivity in the face of a power that is independent of us; a power we call ‘existence’ or ‘reality’.”¹¹

If Fleck is right, then the question of truth in science can *never* be a simple question of correspondence with the world as it really is, independent of all disciplinary methods, techniques and discourses. Fleck is quite explicit on this point:

Truth is not “relative” and certainly not “subjective” in the popular sense of the word. It is always, or almost always, completely determined within a thought style. One can never say that the same thought is true for A and false for B. If A and B belong to the same thought collective, the thought will be either true or false for both. But if they belong to different thought collectives, it will just *not* be *the same* thought. It must either be unclear to, or be understood differently by, one of them. Truth is not a convention, *but rather (1) in historical perspective, an event in the history of thought, (2) in its contemporary context, stylized thought constraint.*¹²

To sum up Flecks position:

We perceive that which we are able to perceive, given our bodily makeup and the abilities we have acquired through education, physical- and mental training, habit and praxis. In science, this means that the novice looking into the microscope is *not able to* discern what the trained scientist has *learnt* to see. But the process transforming a novice into a fully fledged scientist is not a process where an individual learns to see *all* that there is to see. No, the individual learns to see what is *supposed to be there to be seen*, given the doxic conditions provided by the thought collective and the thought style of the discipline to which the individual belongs.

3

But this leaves us with a difficult conundrum: If we humans can only perceive what we are supposed to perceive, how on earth can we learn anything new? And how did we get the knowledge we have in the first place?

The Greek-French philosopher Cornelius Castoriadis, who worked and lived in Paris up until his death in 1997, used to talk about this as ‘the problem of the new’. Castoriadis was, all through his political and theoretical work, an unrelenting champion of

autonomy – of its importance, its history and its possibilities – not least in epistemological matters. And he insisted upon the necessity of accepting that we humans constantly create new forms in and for our world – that is, we humans do create an objective reality for ourselves on every level, from the biological *Umwelt* through our social and political activities and, most importantly in this context, also in science.

Imagination, Castoriadis claims, is what makes it possible for us human beings (and perhaps also, in a more limited sense, for some of the higher primates) to refuse the heteronomy of the sensational world, and consciously create a world of our own. Each organism, he claims, is autonomous in the sense that it will always have its own world. Its *Umwelt* is species dependent. Man is, of course, autonomous in this sense, just as any other organism is. But according to Castoriadis the full sense of autonomy comes first with imagination, and the possibility of consciously creating and institutionalising (in behaviour, language, representations, buildings, techniques etcetera) *social imaginary significations* for and in our world. These significations are called *social*, because they are shared by a group, a society or even a whole culture; *imaginary*, not because they would in any way be fictional or non real, but because they are the results of the workings of our human imagination; *significations*, because it is in and through them that humans understand and give sense and meaning to their world.

Autonomy proper, for Castoriadis, thus involves a conscious dealing with the creation of a human world, i.e. with something goes far beyond and in a certain sense precedes the problems of an individual choosing between alternatives. He writes:

The self-institution of society is the creation of a human world: of ‘things’, ‘reality’, language, norms, values, ways of life and death, objects for which we live and objects for which we die – and of course first and foremost, the creation of the human individual in which the institution of society is massively embedded.¹³

So for Castoriadis solution to the problem of the new is to reject the notion of us humans as passively facing a ready-made reality. Instead he insists upon our capacity to create the new – that is to create new forms, new ideas in and for our world. He writes

[T]here is creation in being, or, more precisely, being is creation, *vis formandi*: not creation of “matter-energy” but creation of forms. /.../ What is the point in adopting a term with such a loaded history? On the one hand, to end the subterfuges and the sophistries concerning the question of the new: either there is creation, or the history of being (and consequently of humanity too) is an interminable repetition (or an eternal return).¹⁴

And this is also where Fleck and Castoriadis interestingly intersect. Neither of them see the human subject as an autonomous, free subject in the liberal or neo-liberal sense of the term – Castoriadis would emphasise the importance of not confusing social- and political autonomy with simple freedom of choice. Nor do they reject the possibility of specific individual contribution to the general human creation of knowing and knowledge. Both see the human agent as socially situated and conditioned, but not determined – and hence both of them move beyond the barren opposition of freedom or determinism, and open the field for exploring doxic knowledge.

4

But what does a doxological stance imply when it comes to the general possibilities of the answering questions concerning hypothesis and the validity of interpretations in the sciences?

In a chapter his famous book *The Mind in the Cave*, from 2002, the south African archaeologist David Lewis Williams sums up some criteria “by which scientists judge and compare hypothesis” and that, according to him, have to be met for a scientific theory or explanation to be acceptable.¹⁵

I will use these criteria as a base for spelling out a doxological approach to the questions of facts, hypothesis and truths. The criteria represent fairly well what I take to be the current consensus in academia, when it comes to evaluating hypotheses, judging facts and assessing interpretations within the sciences.

Lewis-Williams's first point is that an explanation of a phenomenon must accord with received, well-supported general work as well as with overall theory.

Secondly, he continues, a hypothesis must be internally consistent, that is it must depend in all its parts on the same premises and the parts must not contradict one another.

His third criterion is that a hypothesis that covers diverse field of evidence is more persuasive than one that pertains only to one, narrow type of evidence.

Fourthly, a hypothesis must be such that verifiable, empirical facts can be deduced from it, i. e. that a hypothesis must relate explicitly to observable features of data.

Fifthly, he concludes, useful hypotheses have a heuristic potential, that is, they lead on to further questions and research.¹⁶

Up to a certain point these criteria are both sensible and reasonable to adopt when trying to evaluate a suggested theory, hypothesis or interpretation of any kind of phenomena. But, from a doxological point of view, it is not immediately evident how to understand them. For example, how are we to understand the implicit separation of interpretation from fact, of explanation from interpretation, or, for that matter, of evidence from illusion present in Lewis-Williams's reasoning? All these distinctions seem to be unproblematic for Lewis-Williams, at least on the programmatic level,

whereas they all need to be qualified before they can be accepted as doxological tools. So let me look at each criterion, one by one, and try to spell out a doxological stance.

The first part of the first criterion fits rather well with the notion that in science one has to depart from, and in that sense comply with, the always already pre-existing knowledge within the discipline or the field. As Fleck would say: “The existing fund of knowledge must be a third party in this relation [ie. cognition] as a basic factor of all new knowledge.”¹⁷ Hence this first part is quite uncontroversial. The second part, on the other hand – that the explanation must accord “with overall theory” – is more problematic. Judging from the example presented by Lewis-Williams (“one cannot explain an aberration in a planet’s orbit by invoking laser beams directed at it from living beings in the vicinity of Alpha Centauri”)¹⁸ this part of the criterion is heavily dependent on a specific version of what one could call the scientific common sense of the beginning of the 21st century in the Anglo-Saxon world. That one “cannot” invoke lasers used by living beings on Alfa Centauri is simply not true – of course one *can* invoke such an explanation. Most would agree with Lewis-Williams that it is a bad explanation, or even that it is plainly wrong – but this is not in itself enough to dismiss it. Just recall Michel Foucault’s statement about Mendel,¹⁹ who evidently told the truth but who was not received within ‘the true’ of the biological discourse of his time, to realise how shaky and misleading such evidences may be. From a doxological standpoint, the evoking of Alfa Centauri activities cannot be dismissed simply by a reference to overall theory – one has to show why, in this specific case, this specific explanation is insufficient or unacceptable in relation to the knowledge claim made. Thus, in this case,

the doxological stance does not necessarily imply a change in what is conceived as an acceptable explanation of a fact, or an acceptable solution to a problem – but it *does* imply a change in attitude towards what seems to be evidently wrong, or simply strange. The foundation of doxic knowledge can never be (the experience of) evidence, nor (a reference to) what is given – it has to be construed, each time, within the specific field and discipline, using the specific and accepted methods, styles and practices of the field, always keeping in mind that the construction might have been different, and may become so in a near or distant future.

The second criterion (that a hypothesis must be internally consistent) is also acceptable within a doxological notion of science (I do not really see what it could mean *not* to accept this criterion) – with the important precaution that *one cannot* treat the notion of consistency as something absolute. What is and what is not consistent depends upon, among other things, how narrowly or how widely one needs to define the terms (or, as the case may be, actions, practices and notions) in a specific situation. For a certain type of philosophy it is quite inconsistent to claim that Socrates is both immortal and man; for another type it is quite acceptable – it all depends on how one understands (or perhaps chooses to define) immortality. The understanding and the reasons for choosing are always dependent upon the doxa of the field, the thought-style of the discipline, upon your position in the field as well as upon your reasons for defining the notion, action, habit etcetera in question. That is, it is dependent upon what you want to do with the definition or notion in question. Regardless if consistency is a well and unequivocally defined concept within certain domains of the scientific field, it always

needs to be put into relation with the ever-changing doxic conditions in the specific field, and the specific situation that condition the knowledge of the field in question.

The third criterion – that a “hypothesis that covers diverse field of evidence is more persuasive than one that pertains only to one, narrow type of evidence” – is an interestingly rhetorical one. It differs from the other two in making a claim about what is ‘more persuasive’ – that is, it makes a general, even universalistic, claim about the presumed effects of a certain kind of hypothesis on every kind of audience. Again, I am not disagreeing with Lewis-Williams about the content of the criterion. No doubt, it may be shown both historically, and within contemporary science, that such hypotheses have been, and are, more generally accepted than hypotheses with narrower scopes. But what does this mean?

The example given by Lewis-Williams is telling: “For example, if the theory of gravity applied only to inanimate objects, such as tennis balls, and not to living creatures, such as people, its explanatory value would be so limited that scientists would reject it.”²⁰ The example states something that is no doubt true about a specific kind of audience (scientists), in relation to a specific explanation of why ‘what goes up must come down’. The force of the example – its persuading effect upon us, readers of Lewis-Williams – depends upon our (presumed) preconceived notions about what kind of interests scientists have: We tend (or are supposed) to think that a scientist is someone who is interested in formulating general laws for everything, and that this is the reason why they would not content themselves with an explanation that only concerned ‘inanimate objects’. So the criterion, that seemed to be universally valid, is in fact only valid in relation to a certain notion of science and of scientists – which, again, makes a

case for promoting the doxological notions of situatedness, dependence upon historical and disciplinary conditions as well as upon specific interests of the actors involved.²¹

Plainly speaking: A narrow hypothesis may be just as persuasive as a broad one – it all depends on the situation, the field, the doxa, the actors, the history of the field and the (personal) history of the actors, the pre-existing knowledge, on who (the orator) has announced the hypothesis, on who receives it (the audience), on the actual power-structure in the relationships between all these factors, and so forth.

The fourth criterion is a classical empirical one. One must be able to deduce “verifiable, empirical facts” from a hypothesis, it must “relate explicitly to observable features of data”. This may seem quite straightforward. The hypothesis is supposed to say something about the world that can be verified (as either true or false) by looking at the world and seeing how it is. But from a doxological point of view there is no way the world is in and for itself. What we see is formed by ourselves, our bodily makeup, our concepts, our presuppositions and our interests, and we have no way of knowing whether or when our hypothesis correspond to ‘the world as it is’. Therefore, this criterion must be understood as stating something about the requirements in force within the scientific field, discipline or doxa in question – but not a truth about science or research in general. It may very well be the case that most so called empirical sciences cherish some version of this criterion. Nevertheless, its application has to be determined and discussed specifically in each case. Thus, the doxological position does not endorse relativism in the traditional sense. We need to distinguish facts from guesses, truths from illusions, knowing from believing – but we have to make these distinctions in the full awareness that they are our own constructions, fabrications made

by ourselves in order to deal with the human world that is ours. And that their validity is, and always has been, confined within our (by human measures made) version of the world.

Lewis-Williams's fifth criterion is of a slightly different kind – it tells us that useful hypothesis should have a “heuristic potential”, that is that they should be able to “lead on to further questions and research”. In a way, this is a very doxological criterion, since what is useful and what is to be counted as ‘further questions’ has to be identified as such not only in relation to the already existing bodies of knowledge, but also in relation to specific interests and desires within and between disciplines, epistemic fields, scientists, cultures etcetera. What is, and what is not, a fruitful hypothesis or a ‘further question’ has to be determined in each specific case, with hindsight as well as foresight, and with an as clear as possible notion of the constraints and possibilities contained within the doxa in vigour. The yardstick for judging whether a certain hypothesis has a heuristic potential or not is always to test it within a discipline or an epistemic field, according to the methods that are considered to be sound within the thought collective, and see what results it may yield. Its eventual usefulness may, in happy cases, be judged completely from within the discipline or the field. More often than not it is the result of a negotiation between scientific, personal, economic, political and institutional interests.

So, transformed according to the qualifications just mentioned, I am confident that the five criteria for evaluating hypothesis may serve well also within a doxology.

Conclusion

What Fleck and Castoriadis show us is that the urgent issue in science is not to decide whether or not there really is such a thing as objectivity, or if we can decide once and for all what is a fact or what truth really is. No, they show us that we need to focus on the processes of objectivation within the sciences.

And the reason why we should focus on the processes of objectivation is, for one thing, to see that there are different ways of obtaining scientifically sustainable facts and truths. Each disciplinary domain – physics as well as history, the study of literature as well as sociology, art and chemistry, just to name a few – have developed its own proper procedures, discourses and practices over the years and the centuries. They have, often painstakingly and slowly, formed and refined their own thought styles and shaped their own thought collectives, deciding on what knowing and knowledge, what competences are required by anyone who wants to become part of, and act within, their specific domains. Through history, we have seen the development of different notions of how to establish facts, of what is to be counted as true and of how to distinguish between pure guesses and actual knowing – and it is *only* if one clings to the idea that *all of these should be brought together* in a coherent and consistent total science, that one would be forced to try to decide which truth, which objectivity and which facts are *really* true.

Still, such decisions are, as we know all too well, taken daily. But they are political and/or ideological in the narrow sense – in any case, not scientifically sound in that they are not based upon the autonomous consensus of the scientists working within the disciplinary fields in question. It is such ideological and political decisions that resurrect the barren dichotomies between (universal) objectivity and subjectivity and between knowledge and relativism that we in the scientific community should have left behind a long time ago.

Mats Rosengren, Salamanca, March 25 2017

¹ See Edward Schiappa, *Protagoras and Logos*, University of South Carolina Press, 1991, p. 118. This is, according to Edward Schiappa, the standard translation into English of the protagorean dictum known as the *human measure*-fragment.

² In *Discours de métaphysique*, § XXVII, according to André Lalande. Needless to say that my use of the term differs from the theological use, i.e. 'hymn of praises to God'.

³ I do not wish to imply that there (always) are sharp boundaries between what I here call 'culture', 'society', 'group', or 'discipline'; nor that one could consider the one without considering its relations to the others. Quite the opposite.

⁴ I read and quote Fleck's work in English, following the Phoenix edition of the translation made by Fred Bradely and Thaddeus J. Trenn: *Genesis and Development of a Scientific Fact*, The University of Chicago Press. Chicago, 1981.

⁵ See for example Thomas S. Kuhn's foreword to the English translation of Fleck's book, pp vii-xi. This foreword, written in 1976, is interesting for many reasons, not least for Kuhn's attempt to untangle himself from the more radical parts of Fleck's thought, while still trying to remain within it. After the turn of the millennium, Fleck's work is finally becoming acknowledged –translations, dissertations exploring his work as well as the series of seminars and lectures given by theorist of science Ian Hacking at the Collège de France during the academic year 2002-2003 are examples of this.

⁶ Fleck (1981:38)

⁷ Here I am using the word 'practical' to cover all the, in the traditional sense, doing-related aspects of the process of knowing. I am quite aware that 'practical' is a rather insufficient word in this context.

⁸ Fleck (1981:10-11)

⁹ Fleck (1981: 99)

¹⁰ Cornelius Castoriadis, to whom I will return shortly, describes this ignorance as a heteronomistic cover-over of our creative, autonomous powers.

¹¹ Fleck (1981: xxvii)

¹² Fleck (1981:100)

¹³ Cornelius Castoriadis, *The Castoriadis Reader*, editing and translation David Ames Curtis, Blackwell Publisher, Oxford Malden, 1997, p 269.

¹⁴ [I]l y a création dans l'être, ou, plus exactement, que l'être est création, *vis formandi*: non pas création de 'matière-énergie,' mais création de formes. /.../ Pourquoi adopter ce terme à histoire chargée? D'une part, pour en finir avec les subterfuges et les sophismes concernant la question du nouveau: ou bien il y a création, ou bien l'histoire de l'être (donc aussi de l'humanité) est interminable répétition (ou éternel retour).

From "Complexité, magmas et histoire" in *Fait et à faire – les Carrefours du Labyrinthe V*, Seuil, Paris, 1997, p. 212. The translation is my own.

¹⁵ David Lewis-Williams, *The Mind in the Cave*. London: Thames and Hudson, 2002, p 48

¹⁶ Lewis-Williams (2002: 48-49) I have rendered Lewis-Williams's wordings quite closely, but my paraphrase is not to be taken as a regular quote.

¹⁷ Fleck (1981: 38)

¹⁸ Lewis-Williams (2002: 49)

¹⁹ Michel Foucault, *L'Ordre du Discours*, Seuil,, Paris, 1971, page 36.

²⁰ Lewis-Williams (2002: 48)

²¹ For all this, especially concerning the role of the audience in scientific argumentation, see the seminal work of Lucie Olbrechts-Tyteca and Chaïm Perelman, *Traité de l'Argumentation – la Nouvelle Rhétorique*, Paris, 1958.