Complexity, Deconstruction and Relativism

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Introduction

It is easily acknowledged that different intellectual traditions have different understandings of what the nature and status of meaningful knowledge is. This would not have been a problem if these discourses operated in isolation. However, different epistemological positions interact and compete with one another. This competition is necessary, of course, but it is rarely an amicable one, probably because our basic understanding of the world, and of our role in it, is at stake. Thus there is no agreement even on the *criteria* for what would count as meaningful knowledge.

The need for clarity and certainty has often, and increasingly, been bolstered by an appeal to science, or at least to a certain understanding of what it means to be scientific. This has indeed led to a deeper understanding of the world, but it has also resulted in reductionist strategies of thinking that underestimate the complexity of much of what we try to understand. Fortunately we no longer have to fight against a crude positivism, but at the same time there seems to be a growing resistance against theoretical positions which emphasize the *interpretative* nature of knowledge. More specifically, there seems to be a need to dismiss positions that can be called postmodern, post-structural or deconstructive.

This need is best exemplified by (but certainly not restricted to) the so-called Sokal's hoax and the subsequent dismissal of a number of important postmodern thinkers (Sokal and Bricmont, 1998).[1] There is at least one important lesson to be learnt from this affair: one has to be very careful when using and criticizing work from a foreign discipline (irrespective of whether one is a social or natural scientist).[2] If this remained

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the central contribution of this storm in a thimble, much good could come of it. However, Sokal's hoax is still being used, especially by those promoting science in a new-positivistic way, to dismiss important contributions from thinkers perceived not to be adequately informed about what is really happening in science. When important writers, like Richard Dawkins (2002, pp. 47–53), use Sokal's writings to continue the disparagement of those critical of the role that science plays in establishing certain cultural and political conditions, the matter develops an ethical dimension which should not be concealed under what is offered to the general public as 'scientific facts'. The very appeal to scientific objectivism becomes a political move in establishing a certain mode of understanding as the privileged one.

It may well be that a certain kind of new-positivism is necessary to serve as a correction for some of the excesses of postmodernism. Many post modern positions are so open and vague that they really do not contribute to our knowledge of the world. If that was all there was to it, we could merely let the debate be. However, if we acknowledge that the world in which we have to live is complex, we also have to acknowledge the limitations of our understanding of this world.[3] What is more, some of the theoretical positions that are being dismissed so assertively, like deconstruction, help us to cope with these limitations and should not be relegated to the junkyard of history. They should be developed in conjunction with our growing scientific knowledge.

The opposition sketched above can be generalized into an opposition between what could be called self-confident or assertive positions and modest positions. The term 'modest' will be used to describe reflective positions that are careful about the reach of the claims being made and of the constraints that make these claims possible. The aim of this article is to argue for the importance of modest positions when trying to deal with complex problems. Deconstruction serves as an example and I will argue that the view from complexity serves as another, or rather, as a complementary one.[4] The dismissal of everything postmodern will therefore include the dismissal

of a number of important insights from our understanding of complexity.

Attempts to reject modest positions are based on a number of important arguments which have to be taken seriously. Before this is done, it has to made clear that what is at stake here is not an *apology* for modesty, but an argument for the *importance* of modesty. The failure to acknowledge the complexity of a certain situation is not merely a *technical* error, it is also an *ethical* one. A modest position should not be a weak position, but a responsible one. Such a position will be developed by examining three arguments: the argument that modest positions lead to relativism, the argument that modest positions are subject to the performative contradiction and the argument that modest positions are vague. Before tackling each of these, the view from complexity, at least to my understanding, should be presented briefly.

The view from complexity

There are different understandings of complexity theory and its implications. On the one hand, there is a more strictly mathematical and computational view. This view is often developed via insights from chaos theory. In the cases where such a 'hard' understanding is uncritically appropriated by the human sciences, it can lead to exactly the kind of positivism which is being argued against in this article. On the other hand, there is a more critical understanding of complexity. This view argues that complexity theory does not provide us with exact tools to solve our complex problems, but shows us (in a rigorous way) exactly why these problems are so difficult.[5] This second view may have a more sceptical perspective on what can be done with complexity theory, but it is developed from an understanding that is not really at odds with a generally accepted scientific characterization of complexity. These characteristics can be summarized in the following way:[6]

1. Complex systems are open systems.
2. They operate under conditions not at equilibrium.

3. Complex systems consist of many components. The components themselves are often simple (or can be treated as such).
4. The output of components is a function of their inputs. At least some of these functions must be non-linear.
5. The state of the system is determined by the values of the inputs and outputs.
6. Interactions are defined by actual input-output relationships and they are dynamic (the strength of the interactions change over time).
7. Components on average interact with many others. There are often multiple routes possible between components, mediated in different ways.
8. Some sequences of interaction will provide feedback routes, whether long or short.
9. Complex systems display behaviour that results from the *interaction* between components and not from characteristics inherent to the components themselves. This is sometimes called emergence.
10. Asymmetrical structure (temporal, spatial and functional organization) is developed, maintained and adapted in complex systems through internal dynamic processes. Structure is maintained even though the components themselves are exchanged or renewed.
11. Complex systems display behaviour over a divergent range of timescales. This is necessary in order for the system to cope with its environment. It must adapt to changes in the environment quickly, but it can only sustain itself if at least part of the system changes at a slower rate than changes in the environment. This part can be seen as the 'memory' of the system.
12. More than one description of a complex system is possible. Different descriptions will decompose the system in different ways. Different descriptions may also have different degrees of complexity.

If one considers the implications of these characteristics carefully a number of insights and problems arise:

1. The *structure* of a complex system enables it to behave in complex ways. If there is too little structure, i.e. many degrees of freedom, the system can behave more randomly, but not more functionally. The mere 'capacity' of the system (i.e. the total amount of degrees of freedom available if the system was not structured in any way) does not serve as a meaningful indicator of the complexity of the system. Complex behaviour is possible when the behaviour of the system is constrained. On the other hand, a fully constrained system has no capacity for complex behaviour either. (This claim is not quite the same as saying that complexity exists somewhere on the edge between order and chaos. A wide range of structured systems display complex behaviour.)
2. Since different descriptions of a complex system decompose the system in different ways, the knowledge gained by any description is always relative to the perspective from which the description was made. This does not imply that any description is as good as any other. It is merely the result of the fact that only a limited number of characteristics of the system can be taken into account by any specific description. Although there is no *a priori* procedure for deciding which description is correct, some descriptions will deliver more interesting results than others.[7]
3. In describing the macro-behaviour (or emergent behaviour) of the system, not all the micro-features can be taken into account. The description is a reduction of complexity. Nevertheless, macro-behaviour is not the result of anything else but the micro-activities of the system. Yet, to describe the macro-behaviour purely in terms of the micro-features is a difficult task. When we do science, we usually work with descriptions which operate mainly on a macro-level, but these descriptions will, more often than not, be approximations of some kind.

These insights have important implications for the knowledge-claims we make when dealing with complex systems. To *fully* understand a complex system, we need to understand it in all its complexity. Furthermore, because complex systems are open systems, we need to understand the system's complete environment before we can understand the system, and, of course, the environment is complex in itself. There is no human way of doing this. The knowledge we have of complex systems is based on the models we make of these systems, but in order to function as models – and not merely as a repetition of the system – they have to *reduce* the complexity of the system. This means that some aspects of the system are always left out of consideration. The problem is compounded by the fact that that which is left out interacts with the rest of the system in a non-linear way and we can therefore not predict what the effects of our reduction of the complexity will be, especially not as the system and its environment develops and transforms in time.[8]

> We cannot have complete knowledge of complex systems; we can only have knowledge in terms of a certain framework. There is no stepping outside of complexity (we are finite beings), thus there is no framework for frameworks. We *choose* our frameworks. This choice need not be arbitrary in any way, but it does mean that the status of the framework (and the framework itself) will have to be continually revised. Our knowledge of complex systems is always provisional.[9] We have to be modest about the claims we make about such knowledge.

The links with postmodern positions, specifically with deconstruction, should now be obvious.[10] Deconstruction argues for the irreducibility of meaning. Meaning and knowledge cannot be fixed in a representational way, but are always contingent and contextual. The context itself is not transparent, but has to be interpreted. Derrida (1988, pp. 118–19) explicitly links the problem of meaning and context to the fact that these things are complex. The critical understanding of complexity theory

presented here, and deconstruction, therefore, make a very similar claim: knowledge is provisional. We cannot make purely objective and final claims about our complex world. We have to make choices and thus we cannot escape the normative or ethical domain.

This is, of course, a contested position. The same arguments used to dismiss deconstruction can now also be used to dismiss the view from complexity. Nevertheless, the question remains whether these arguments are effective, whether they actually show that this position is a weak one that should no longer be taken seriously. That is why they have to be examined more carefully.

Against relativism

Perhaps it is not necessary to spend too much time in defending deconstruction and the view from complexity from the accusation that they lead to relativism. This accusation usually comes as a kind of knee-jerk reaction in a bid to dismiss or demolish deconstruction and usually after it has superficially – and erroneously – been associated with post-modernism. A good example of this position can be found in Sweetman (1999). After claiming that the work of Derrida is 'an ideal representative of postmodern philosophy in general' (pp. 5–6), he proceeds to criticize it on the following five points (pp. 6, 14):

1. it confuses aesthetics with metaphysics;
2. it mistakes assertion for argument in philosophy;
3. it is guilty of relativism (both epistemological and moral);
4. it is self-contradictory;
5. it is guilty of intellectual arrogance because its proponents insist that its critique of traditional philosophy can still succeed even though its positive claims have not been established.

These kinds of criticisms have been addressed in some detail by Derrida, for example in the Afterword to *Limited*

Inc. (Derrida, 1988) and by others (for example Norris, 1997), and will, therefore, not be repeated here. The argument is mostly pursued by those still working with a strict (and hierarchical) distinction between analytical and continental philosophy,[11] or between natural science and the humanities. This kind of distinction is also active in the complexity community between those arguing for a strict scientific or mathematical foundation for complexity theory, and those seeing complexity as something more metaphorical.[12] Generally speaking, these dichotomies serve mostly as stumbling blocks, or as ways to dismiss intellectual opponents and not as a framework for fruitful discussion.

Virtually nobody claims to be a relativist; it is a self-refuting position. Why then is the accusation that a certain position implies relativism used so often? It has to be because of a deeply held fear that perhaps 'true' knowledge will continue to elude us. We have to keep on convincing ourselves that relativism is bad. But there is more to it. A true relativist, i.e. somebody that argues that there are no grounds for any form of knowledge is, in a way, nothing but a disappointed foundationalist. If he cannot find objective and universal points of reference to guarantee knowledge, then he may as well give up. The argument between foundationalists and relativists is a dead end – a family fight.

What then is the status of the claim that we cannot know complex things completely if it does not imply relativism? In the first place, one should realize that the claim that we cannot have complete knowledge does not imply that anything goes. 'Limited' knowledge is not equivalent to 'any' knowledge. If this were so, any modest claim, i.e. any claim with some provisionality or qualification attached to it, would be relativistic. The only alternative then would be an arrogant self-assurance. Such a self-assured position is deeply problematic since its complacency forecloses further investigation. Modest claims are not relativistic and, therefore, weak. They become an invitation to continue the process of generating understanding.

Against the performative contradiction

A serious philosophical argument often brought against deconstruction, for example by Habermas (1987, pp. 185–210), is that it is subject to the performative contradiction. Simply put, this mistake is made when there is a contradiction between what you say, and the way in which you say it. Thus Habermas claims that when Derrida argues against reason, he has to make use of rational means. 'Anyone who argues against reason is necessarily caught up in a contradiction: she asserts at the locutionary level that reason does not exist, while demonstrating by way of her performance in argumentative processes that such reason does in fact exist' (Fleming, 1996, p. 169). The claim made above – that we can never have complete knowledge of complex systems – falls into the same trap. It looks like an absolute statement about complex things but denies that such a statement can be made.

Whether Habermas is correct in his assessment that Derrida argues against reason[13] is of less importance now than it is to look at the 'logic' of the performative contradiction. The first thing one should notice is that most careful or modest claims will come under pressure from this test. The claim 'no sentence has an exact meaning' obviously fails the test, but the claim 'perhaps some sentences are not perfectly clear' is also in trouble. If it is correct, then the sentence itself is perfectly clear. If it is not correct, then perhaps all sentences are clear. This point can be made more explicit by examining what kind of statements would *pass* the test. The claim, 'When I am rational I will always be right' passes the test with flying colours! It may not be true, but there is no contradiction between what I say and how I am saying it. I am always right, and I am also right that I am always right, and I can make this claim in an assertive tone of voice.

Surely a test that will pass most self-assertive, macho claims and that will fail most modest claims, cannot be all that useful when dealing with complex things. Some reasons for this can be supplied. The performative contradiction is predicated on the assumption that one can adequately distinguish between the

performative and the locutionary levels, and, in the terms Habermas uses to criticize Derrida, between logic and rhetoric. However, in order to make this distinction clearly, one would need to take in a position that can characterize what is being said from an external vantage point. In the language of complexity, that would mean that one has access to a framework that is not the result of a strategic choice, i.e. some objective meta-framework. This is exactly what the view from complexity is sceptical about. The argument is that our frameworks are all compromised to some extent; dealing with complexity is a little messy. As Derrida (1988, p. 119) says: "if things were simple, word would have gotten around".[14]

In a way, the view from complexity acknowledges that some form of performative tension is inevitable. We are playing in what Wood (1990, p. 150) calls the 'theatre of difficulty', and this requires a certain 'performative reflexivity' (p. 132). We need to demonstrate the difficulties we are in; also in the way we talk about them. Our discourse should reflect the complexities. To talk about the complex world as if it can be understood clearly is a contradiction of another kind[15] and this is a contradiction with ethical implications. Those who claim to have access to the truth are denying us our critical perspective and, therefore, keep us in a kind of false consciousness by not restoring the world to its original difficulty. It is only by acknowledging that we are in trouble that we can start grappling with the complexities around us.

To be subject to the performative contradiction would seem, at least from the perspective of a certain kind of logical argumentation, to be a weak position. Such a position is seen as not being sufficiently rational and thus unscientific and irresponsible. The view from complexity argues to the contrary, that the conditions imposed by the test for performative contradiction feeds off a kind of intellectual arrogance that is in itself irresponsible. We only have limited access to a complex world and when we are dealing with the limits of our understanding, we are dealing with ethics. In Derrida's (2000, p. 467) words: 'There is ethics precisely where I am in performative powerlessness.' The modest position is not weak; it is responsible.

Against vagueness

A third objection to the view from complexity is that it results in a position which is vague.[16] The argument could be made that because this position is loathe to make strong claims for the truth of its statements, it can only produce vague generalizations or platitudes which offer little resistance to being interpreted loosely. This objection is perhaps related to, but not quite the same as, the one accusing the view from complexity of relativism. In trying to avoid relativism, the argument may go, specific claims can be made; but in a way that is so watered down, or obscure, that one cannot come to grips with them.

The objection is most certainly valid in many cases. In some (postmodern) circles a vague kind of chatter, employing a shared vocabulary in an uncritical way, has become acceptable – one could even say a new orthodoxy. Sokal's hoax certainly contributed to the exposure of this. There is no excuse for academic groupies or sloppy reviewing practices (the prime reason why Sokal's fake article was allowed to create the stir it did). The problem is exacerbated by the fact that much of the terminology used by the groupies is borrowed from decent academic disciplines. Examples of such jargon include difference, deconstruction, democratic, power, gender, rhizomatic, signifier, dialectic, quantum, chaos and complexity. It becomes difficult to establish when these terms are used with insight, and when they are only mentioned in order to make acceptable noises. (Many of these terms have, of course, been used in this article.)

There is no defence for this vague groupspeak. However, it must be emphasized that there is no reason in principle why a modest position should be a vague one. For a statement to be intelligible at all, it must be possible to distinguish it from other claims. Intelligibility does not result from some external guarantee, some truth-giving process, but it is the result of a process of differentiation; a process that has nothing to do with fuzziness. Not grasping this point has led to a number of misguided dismissals of deconstruction. The deconstructive

claim that meaning is not saturated, or that language has an element of 'play,' does not imply that there is no meaning, or that any meaning of a term is as good as any other. The deconstructive claims have to do with the *limits* of our claims, not with their intelligibility.

In reply to questions arising from Searle's critique of deconstruction, Derrida (1988, pp. 114–31) discusses this issue in some detail.

> Every concept that lays claim to any rigor whatsoever implies the alternative of 'all or nothing'. Even if in 'reality' or in 'experience' everyone believes he knows that there is never 'all or nothing', a concept determines itself only according to 'all or nothing'. Even the concept of 'difference of degree', the concept of relativity is, qua concept, determined according to the logic of all or nothing, of yes or no: differences of degree or nondifference of degree. It is impossible or illegitimate to form a *philosophical concept* outside this logic of all or nothing. (pp. 116–17).

Derrida's point is that for communication to take place at all, concepts (or signs) have to be recognizable (iterable), and therefore they have to be differentiated from other concepts. This differentiation cannot be vague, or done by statistical approximation since that would not delineate the concept in question. He continues his argument:

> [one] neither can nor should avoid saying: it's serious *or* nonserious, ironical *or* nonironical, present *or* nonpresent, metaphorical *or* nonmetaphorical, . . . etc. To this oppositional logic, which is necessarily legitimately a logic of 'all or nothing' and without which the distinction and the limits of a concept would have no chance, I oppose nothing, least of all a logic of *approximation [á peu prés],* a simple empiricism of difference in degree; rather I add a supplementary complication that calls for other concepts, for other thoughts beyond the concept and another form of 'general theory', or rather another discourse, another 'logic' that

accounts for the impossibility of concluding such a 'general theory'. (p. 117).

However, the fact that the concept has to be communicated clearly, not by approximation, does *not* imply that the concept now has an indisputable identity. In a different context a different set of differentiations may come into play which would give the (still clearly recognizable) concepts different meanings. For the concept to have meaning at all, it has to be limited, but these limits are not *a priori* or external to the situation. They are contingent and historical. The 'art' of deconstruction, like the art of modelling complex systems, is in many ways nothing more than the examination of these limits.

In a way similar to deconstruction, the view from complexity claims that we cannot know complex things completely (Cilliers, 2002). This does not imply that we can know nothing about complex systems, or that the knowledge claims we make about them have to be vague, insipid or weak. We can make strong claims, but since these claims are limited, we have to be modest about them.

Conclusion: against arrogance

When dealing with complexity, modest positions are inescapable. This does not imply that they should be relative, vague or self-contradictory, nor does it imply a reason to cringe in false modesty. We can make clear, testable assertions about complex systems. We can increase the knowledge we have of a certain system, but this knowledge is limited and we have to acknowledge these limits.

The fact that our knowledge is limited is not a disaster, it is a *condition* for knowledge. Limits *enable* knowledge. Without limits we would have to incorporate life, the universe and everything into every knowledge claim we make and that is not possible. Limiting frameworks makes it possible to have knowledge (in finite time and space). At the same time, having limits means something is excluded, and we cannot predict the

effects of that exclusion. Knowledge is a fragile and, above all, *contingent* thing (see also Barrow, 1999, & Luntley, 1995, pp. 136–49).

The notion that limits and constraints are necessary conditions for knowledge has an important corollary in the complexity debate. It has been argued above that meaningful structure can only develop in a complex system if there are constraints in place. The fact that a system has many degrees of freedom is in itself no guarantee for complex behaviour. It is only when this freedom is constrained that structure can arise. Such structure is not *a priori* or externally given, but is developed in response to contingent conditions in the history of the system and has a certain resilience. Complex systems are not balanced on a knife's edge between chaos and order. They have mostly robust structures, which change over time and enable the system to respond to different circumstances. It is, therefore, incorrect to associate complexity with noise as Taylor (2001) does. If complexity is aligned with notions of chaos, randomness and noise, the accusations of relativism and vagueness will start to hold water. If it is aligned with notions of structure as the result of contingent constraints, we can make claims about complex systems which are clear and comprehensible, despite the fact that the claims themselves are historically contingent.

The view from complexity entails that we cannot have perfect knowledge of complex systems. We cannot 'calculate' the performance of, for example, complex social systems in their complexity; we have to reduce that complexity; we have to make *choices*. Normative issues are, therefore, intertwined with our very understanding of complexity. Ethical considerations are not to be entertained as something supplementing our dealings with social systems. They are always already part of what we do. One could attempt to deny that and operate as if one can deal with complexity in an objective way – as if we can calculate everything – and thereby avoid the normative dimension. But this denial of the ethical becomes an avoidance of responsibility and is, of course, ethical in itself, albeit a negative (and much too prevalent) ethics.

Furthermore, the claim that our understanding of complex systems cannot be reduced to calculation means that there will always be some form of creativity involved when dealing with complexity. 'Creativity' should not (only) be understood in terms of flights of fancy or wild (postmodern) abandon, but also in terms of a careful and responsible development of the imagination. Imagining the future will involve risk, but the nature of this risk will be a function of the quality of our imagination. It is important that we start imagining better futures, and for that we need better imaginations. Reading books, listening to music, appreciating art and film is not a form of entertainment to be indulged in after we have done our serious work. These creative activities stimulate the imagination and thereby transform the frameworks we apply when apprehending the world. If we do not foster the creative arts, we will end up in the well-managed dystopia of the brave new world.

The view from complexity argues for the necessity of modest positions. In order to open up the possibility of a better future we need to resist the arrogance of certainty and self-sufficient knowledge. Modesty should not be a capitulation, it should serve as a challenge – but always first as a challenge to ourselves.

Notes

1. Other examples include Ellis (1989) and O'Neill (1995). For a more balanced engagement, see Wheeler (2000) and Luntley (1995).
2. For some responses to Sokal (none of them from a 'French' perspective), see Beller (1998), Guillory (2002) and Haworth (1999).
3. This is argued for in the next section.
4. For other discussion of the relationships between complexity and post-structuralism, see Taylor (2001) and Dillon (2000). Some of the critics of deconstruction, as well as some of its more radical (but uninformed) supporters, see it as a new form of nihilism, as something which contemplates emptiness, or the 'void'. This is, to my mind, an incorrect interpretation of Derrida's position. He is at pains to show that there is always a plenitude of meaning,

not a lack of it. The play of *différance* creates meaning, it does not destroy it. It is exactly in this respect that there is a close link between deconstruction and complexity. Both emphasize that we deal with a world of growing plenitude, that our understanding of that world involves a reduction of the plenitude, and that there is no meta-method for doing such a reduction. For some of Derrida's clearest articulations on this issue, see Derrida (1988), especially the A*fterword*.

5. See Richardson and Cilliers (2001) for a discussion of some of these issues.
6. These characteristics were formulated in collaboration with Fred Boogerd and Frank Bruggemans at the department of Molecular Cell Physiology at the Free University, Amsterdam. Similar lists by Holland (1998, pp. 225–31), Emmeche (1997), Kauffman (1971) and Cilliers (1998) were consulted in the process.
7. This issue will be returned to when we deal with relativism.
8. These ideas are elaborated upon in Cilliers (2000) and (2001).
9. For a similar view, see Najmanovich (2002).
10. Dillon (2000: 4) describes the relationship between post-structural positions and complexity theory as a commitment to the 'anteriority of radical relationality'. He proceeds to argue for certain differences between the two. His categorization of 'complexity' is, however, a little general. I argue for an understanding of complexity which is not primarily concerned with intelligence, survival or fitness (p. 22), but with the limits of our knowledge, and thus with the inevitability of normative components. This interpretation of complexity is to my mind compatible with post-structuralism, at least in its Derridean form.
11. See Nuyen (1989) for a discussion of why a systems approach is difficult to maintain from the analytical perspective.
12. See note 5.
13. See Fleming (1996) for a further discussion of this issue. She argues that deconstruction works from within the tradition of rational argument.
14. In the Afterword to *Limited Inc.*, Derrida (1988) defends his position against several accusations, including that it is a relativist position, and that it is obscure:

> These things are difficult, I admit; their formulation can be disconcerting. But would there be so many problems and misunderstandings without this complexity and without these paradoxes? One shouldn't complicate things for the pleasure of

complicating, but one should also never simplify or pretend to be sure of such simplicity where there is none. If things were simple, word would have gotten round, as you say in English. There you have one of my mottos, one quite appropriate for what I take to be spirit of the type of 'enlightenment' granted our time. Those who wish to simplify at all costs and who raise a hue and cry about obscurity because they do not recognize the unclarirty of their good old *Aufklärung* are in my eyes dangerous dogmatists and tedious obscurantists. No less dangerous (for instance, in politics) are those who wish to purify at all costs. (p. 119).

15. Derrida makes the same point in his defence against Habermas' claim that deconstruction is subject to the performative contradiction. See Derrida (1988, p. 134, f.n. 9). See also Derrida (2000).

16. The problem of vagueness has received a lot of attention in Logic where the issue at stake is the relationship between the sometimes vague sentences in natural language and the precise statements of logic and mathematics. How does logic deal with borderline cases, and how does it solve the Sorites paradox (one grain of sand is not a heap, two grains of sand is not a heap, . . .)? One suggestion is to modify classical logic into fuzzy logic. Although it is related to what will be discussed, the problem of vagueness in logic will not be investigated here. See Greenough (2003), as well as the other articles in *Mind* Vol. 112, for more detail.

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