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Between the Actual and the Trivial World

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ABSTRACT: The subject of this paper is the notion of similarity between the actual and impossible worlds. Many believe that this notion is governed by two rules. According to the first rule, every non-trivial world is more similar to the actual world than the trivial world is. The second rule states that every possible world is more similar to the actual world than any impossible world is. The aim of this paper is to challenge both of these rules. We argue that acceptance of the first rule leads to the claim that the rule *ex contradictione sequitur quodlibet* is invalid in classical logic. The second rule does not recognize the fact that objects might be similar to one another due to various features.

KEYWORDS: Counterfactuals – counterpossibles – impossible worlds – possible worlds – trivial world.

1. Introduction

It is significant that we make some inferences which are based on what is impossible. Consider the following examples:

(1) If Hobbes had squared the circle, then mathematicians would be impressed.
(2) If Hobbes had squared the circle, then mathematicians would not be impressed.

(3) If it were the case that $2+2=5$, then it would not be the case that $2+3=5$.

(4) If it were the case that $2+2=5$, then it would be the case that $2+3=5$.

Common intuition and practice show that we tend to take (1) and (3) to be true and (2) and (4) to be false. Since all of these claims are in the form of conditionals, it is reasonable to expect that their truth or fallacy can be explained in terms of theories of counterfactuals. Unfortunately, according to the well-known analysis of worlds semantics, all of them are taken to be vacuously true.

Because of this, many contemporary philosophers of modality have been arguing that a standard analysis of counterfactuals in the framework of possible worlds semantics is insufficient when it comes to counterpossibles, i.e., counterfactuals with impossible antecedents.[1] As an alternative to the traditional approach, they have proposed an extended account that is based on worlds semantics which commits to possible as well as impossible worlds. One of the main aims of this extension was to satisfy the need for an explanation of reasoning about what is taken to be impossible (see Yagisawa 1988; Mares 1997; Nolan 1997; Restall 1997; Vander Laan 1997; 2004). Introducing impossible worlds raises many philosophical questions, and even though one can find various analyses of the logical structure and ontological status of impossible worlds and their application, few of these analyses discuss the important notion of similarity between worlds.[2] The importance of this notion lies in its role, which is to determine whether a given counterfactual (with a possible or impossible antecedent) is true or false.

Although "the discussion developed so far should show that the issue of the structure, closeness and ordering of impossible worlds is quite open" (Berto 2013), there are two claims which are in some sense the core of the standard understanding of the notion of similarity. The first one is commonly shared among the advocates of impossible worlds; the second one raises some doubts. According to the first claim, the trivial world, i.e., the world where everything

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1 As 'standard analysis' we mean theories delivered by Robert Stalnaker (see Stalnaker 1968) and David Lewis (see Lewis 1973).

2 For a comprehensive analysis of the ontological status of impossible worlds, see Berto (2013), Nolan (2013).

is the case, is the most dissimilar to the actual world (@). In other words, every non-trivial world (possible or impossible) is closer (more similar) to the actual world than the trivial world is. We will call this claim the Dissimilarity of the Trivial World (*DTW*). The second assumption about similarity and impossible worlds is the Strangeness of Impossible Condition (*SIC*), according to which every possible world is closer to the actual world than any impossible world is. Both of these claims were formulated by Daniel Nolan (see Nolan 1997). Though *prima facie* both are compelling, we will show the reasons for believing that a proper analysis of counterfactuals requires that they be rejected.

The result of our investigation should be as general as possible, and because of this we will not discuss any particular account of the metaphysics of an impossible world. The reason for this is that the notion of similarity, which is our main concern, is taken to be a part of semantics, and not of metaphysics of impossible worlds. Moreover, *DTW* and *SIC* have their advocates among philosophers who take impossible worlds to be concrete, spatiotemporal objects (cf. Yagisawa 1988), as well as among those who believe that impossible worlds are abstract entities (cf. Nolan 1997). As such, our investigations are in an important respect independent of what the metaphysical nature of impossible worlds is. Nevertheless, we will base our analysis on two heuristic assumptions. According to the first one, the actual world is ruled by classical logic. The second assumption is that postulating impossible worlds should not lead to changes in the logic of the actual world.[3] These assumptions will help us point to the main concern about *DTW*. Even though the acceptance of *DTW* has particular consequences for advocates of the two above-mentioned assumptions, we shall see that philosophers who believe that the actual world is ruled by one of the non-classical logics are in no better position.

2. Counterpossibles

Counterpossibles can be represented as sentences of the form: "If it were the case that *A*, then it would be the case that *C*" ($A > C$), in which it is stated that the truth of an impossible antecedent (*A*) leads to a given consequent (*C*). Examples were already provided at the very beginning of the text:

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[3] This view is shared by Daniel Nolan (see Nolan 1997) and David Vander Laan (see Vander Laan 1997), among others.

(1) If Hobbes had squared the circle, then mathematicians would be impressed.
(2) If Hobbes had squared the circle, then mathematicians would not be impressed.
(3) If it were the case that $2+2=5$, then it would not be the case that $2+3=5$.
(4) If it were the case that $2+2=5$, then it would be the case that $2+3=5$.

Each of the above counterfactuals contains impossible (necessarily false) antecedents. This means that there are no possible worlds in which these antecedents are true. After all, it is impossible to square the circle, and it is impossible that $2+2=5$. According to the standard analysis of counterfactuals:

(CF) "$A > C$" is true in @ iff either (a) there is no world where A is true or (b) every world w where A and C are true is more similar to the actual world than any world w', where A is true but C is false.

In virtue of CF, sentences (1)-(4) are true since all of them satisfy condition (a). On the contrary, we would rather like to consider only *some* of them to be true and others to be false; for that reason, a more sensitive analysis of their truth is required.

To solve this problem, many philosophers have argued that one needs to invoke impossible worlds, i.e., worlds where what is impossible is true. They claim that just as for every possibility there is a possible world which represents it, then for every impossibility there is an impossible world which represents what is impossible from the actual world's point of view (e.g., Yagisawa 1988). As a consequence, the advocates of impossible worlds postulate worlds where, for example, a round square exists, 10 is a prime number, $2+2=5$, it is raining and not raining at the same time, etc.

To avoid the trivial consequences of postulating worlds where necessarily false claims are true, one should assume that impossible worlds are elements of other logical spaces than the space of possible worlds. It is worth noting that because of this, modal terms should be taken as indexical with respect to given logical spaces: What is impossible in our logical space (i.e., in all worlds which are ruled by classical logic) is possible in some other logical spaces (e.g., paraconsistent spaces). In this sense, every impossibility is true in some world, but that world has to be outside the set of possible worlds.

Of course, there is no "equality" between different impossible worlds. Some of them are closer (more similar) to the actual world than others. As we have already mentioned, there are issues that pertain to determining how to measure similarity between worlds. This was not easy in the case of standard analysis, and now, when one introduces a plenitude of impossible worlds, it is even more puzzling. Nevertheless, it seems that we can point to a claim which at least tells us what the most dissimilar world is:

> First, it is intuitive to claim that some impossible worlds are more similar to the actual world @ than others. For instance, the explosion world (call it *e*) at which everything is the case, that is, at which every sentence is true, seems to be as far from @ as one can imagine, provided one can actually imagine or conceive such an extremely absurd situation. Now, pick the impossible world, *t*, at which everything is as in @, except that I wear an impossible t-shirt which is white all over and black all over. Intuitively, *t* is closer to @ than *e*. (Berto 2013)[4]

Regardless of the detailed account of the similarity, the existence of a plenitude of possible as well as impossible worlds and their sets allows us to avoid the vacuous truth of counterfactuals with necessarily false antecedents. Thanks to these, one can easily extend the standard analysis by claiming that since every impossibility is true in some of impossible worlds, we can add these kinds of worlds to the original analysis:

(CF*) "$A > C$" is true in @ iff every (possible or impossible) world *w* where *A* and *C* are true is more similar to the actual world than any world *w'* where *A* is true but *C* is false.

This extension should keep the analysis of counterfactuals from being insensitive to the problem of counterpossibles. Sentence (1) is considered to be true because there is an impossible world in which the antecedent and the consequent of this counterfactual are both true, and this world is more similar to the actual world than any world where the antecedent and consequent of (2)

4 See also Nolan (1997).

are true.[5] Thanks to this, one can present non-vacuously true reasoning that is based on necessarily false claims.

3. The trivial world

The above extension works well for most examples of counterpossibles, but it seems that when it comes to the trivial world, troubles arise. Although it might be bizarre enough, postulating the existence of this world is the simple consequence of the claim that for every impossibility there is a world where it is true. If we agree that it is impossible that everything is true, then there is an impossible world where everything is true – the trivial world. Since we assumed that the actual world is ruled by classical logic, when considering the trivial world, it is worth assembling it with one of the fundamental rules of this logic, i.e., the so-called Rule of Explosion, also known as *ex contradictione sequitur quodlibet* (*ECQ*). It is usually expressed as an implication $[A \wedge \neg A] \rightarrow B$ and states that from contradiction everything follows. The reason we mention it here is that there is only one world where B as mentioned above is true, and this is the trivial world.

Analysis of the relationship between implication and counterfactuals has a rich history in the philosophical literature (cf. Bennett 2003, 20-44), but besides the many differences in the various approaches to this issue, lately one claim seems to be commonly accepted. It can be expressed as $A \rightarrow B \vdash A > B$, and it states that "any logical truth of the form $A \rightarrow B$ gives rise to the true conditional $A > B$" (Priest 2009, 331).[6] This connection between implication and conditionals allows us to consider the following sentences:

(5) If there were a true contradiction, then everything would be the case.
(6) If there were a true contradiction, then (still) not everything would be the case.

Let us assume that the antecedent and consequent of (5) are true in w_1, while those of (6) are true in w_2. From classical logic's (i.e., the actual world's)

[5] Similarly in the case of (3) and (4).

[6] See also Gibbard (1981); and Kratzer (2012, 87-9). It should be stressed that this does not mean that any true conditional results in a true implication.

point of view, the antecedents of both of these counterfactuals express impossibility, so in order to evaluate their truth we should assume that both w_1 and w_2 are impossible worlds. The important difference between them is that w_1 is the trivial world, whereas w_2 is a non-trivial one. Assuming that the actual world is ruled by classical logic, we would rather like to admit the truth of (5) than of (6). This is so because the first one is just a counterfactually expressed *ECQ*, and as such it tells us what would be the consequence of a true contradiction in the actual world, and in any other world in which classical logic is valid. If this is truly so, then (according to CF*) we have to admit that w_1 is more similar to the actual world than w_2. But as was stressed above, one of the basic assumptions in the theories of impossible worlds is that the trivial world is the most dissimilar from the actual world. If we assume *DTW* and admit that the trivial world (w_1) is the most dissimilar to the actual world, then w_2 is more similar than w_1. As a result, (6) becomes a true counterfactual and (5) should be taken to be false. If (5) is false, then *ECQ* is false (invalid) as well. In consequence, the analysis of counterpossibles leads to a rejection of one of the fundamental rules of classical logic, which means that classical logic is invalid in the actual world.

This conclusion might lead to at least two consequences. On the one hand, we can claim that since *DTW* leads to falseness of classical logic in the actual world, we should reject *DTW*. In our opinion this is a correct way of addressing the above issue. Nevertheless, what for us is a *modus tollens*, some philosophers might take to be a *modus ponens* and argue that it is the case that *ECQ* is false in the actual world. This result is consistent with those theories of impossible worlds which are based on paraconsistent logic (see Mares 1997; Priest 1997; Restall 1997). Although it is one of the interpretations of the concept of an impossible world, it leads to a controversial conclusion: that true contradictions are possible. After all, if the actual world is an element of space of paraconsistent logic, and every world of this space is a possible one, then it is possible that there are true contradictions. Because of this consequence, many theorists of impossible worlds would like to avoid changing the logic of the actual world in order to deal with impossibilities.

Moreover, the problem is more complicated than deciding what the logic of the actual world is. As we will see, the question of validity of *DTW* is in a way independent of the question about the logic of the actual world. One may argue that taking (5) to be true undermines the impossible worlds analysis of counterpossibles in general. After all, this entire framework was meant to show some non-vacuously true reasoning based on what is impossible, and (5) shows us that from contradiction everything follows. In this sense, every sentence that is both true and false should imply everything, and it seems to contradict the basic motivations of introducing impossible worlds in the first place. Now the question is: how can one believe in the truth of (5) and at the same time make some non-vacuous inferences based on paraconsistent logic?

To answer this question, we should notice that there is an important difference between assuming true contradiction in classical logic, on the one hand, and contradictions which are true in one of the worlds in the space of paraconsistent logic, on the other. When we are thinking about such a contradiction which does not lead to the truth of everything, we are considering the last option. In this sense, every non-vacuously true counterpossible with a contradiction as an antecedent is (implicitly or explicitly) assigned as true in the world of paraconsistent logic. Consider the two examples:

(7) If it were raining and not raining at the same time, then everything would be the case.

(8) If it were raining and not raining at the same time, then not everything would be the case.

Both of these contain impossible antecedents, and it seems that we can find two different contexts in which they have different truth values. If we try to analyze them with the assumption that classical logic is valid, then (7) would be true and (8) would be false, just as in the case above of (5) and (6). On the other hand, if the counterfactuals above were preceded by a claim such as "Assuming the validity of paraconsistent logic, …" then obviously we would say that (8) is true and (7) is false. After all, that is what the advocates of paraconsistent logic would like to claim. In other words, one can find a reason to believe that there is a context in which (7) is true and others where it is false. In this sense, just because we take (5) to be true does not mean we treat *every* contradiction in the same way; especially not those which are true in a world ruled by paraconsistent logic.

In virtue of the above, if one either hesitates to admit the truth of (5) and the falseness of (6), or one *does* believe that a change of the logic of the actual world would help to save the validity of *DTW*, one can easily change examples (5) and (6) to:

(5*) *If classical logic were valid*, and if there were a true contradiction, then everything would be the case.

(6*) *If classical logic were valid*, and if there were a true contradiction, then (still) not everything would be the case.

Similarly as our previous examples, both counterfactuals have an impossible antecedent. Moreover, (5*) corresponds to the trivial world w_1, and (6*) corresponds to the non-trivial world w_2. What differentiates our examples is that the antecedent of (5*) and (6*) is impossible *regardless* of what the logic of the actual world is. After all, no matter what the logic of the actual world is, the conjunction "classical logic is valid and there are true contradictions" is necessarily false. This shows that the consequence of accepting *DTW* is not merely that *ECQ* is invalid in the actual world, but rather that *ECQ* is invalid in classical logic in general. After all, (5*) expresses one of the basic views held by the advocates of classical logic. Obviously, if one believes that the actual world is ruled by classical logic, then this implies that *ECQ* is not valid in the actual world. Nevertheless, the problem that we are trying to point to does not affect only classical logicians. As (5*) and (6*) show, this problem is in an important aspect irrelevant to what the true logic of the actual world is. What is important is that according to classical logic, *ECQ* is a valid principle and that the consequence of *DTW* contradicts this.

4. Diagnosis

It seems that the problem with *ECQ* and impossible worlds as presented above is based on acceptance of the following assumptions:

(i) For every impossibility there is a world that represents this impossibility.

(ii) The valid implication $A \rightarrow C$ entails the true counterfactual $A > C$.

(iii) The trivial world is the most dissimilar to the actual world (*DTW*).

Because of this, if one would like to save the validity of *ECQ* in classical logic and give an interesting analysis of counterpossibles, one should reject one of the above assumptions. Let us consider the reasons for and the consequences of rejecting each of them.

The first assumption expresses the fundamental claim of the advocates of impossible worlds. Of course, it may be controversial, and leads to the "incredulous stare", mostly because it is difficult to conceptualize a world where everything is true (w_1). It is even more complicated to conceptualize worlds where classical logic is true, where contradiction is true and where it is not the case that everything is true (w_2). After all: what does it even mean to say that classical logic is true in a world where contradiction is true? The truth of one of these claims implies the falseness of the other. In this sense, one could say that we are in fact neither talking about classical logic nor about contradiction.

This objection seems to be the standard reaction to postulating the worlds w_1 and w_2. Someone might say that it is impossible for there to be a world where classical logic is true and where contradiction is true as well. Fair enough, but let us remember that we are dealing with *im*possible worlds, and a world where classical logic is true and contradiction is true is one of them. Because of this, if one would like to exclude the above-mentioned world from the modal universe, then there is no reason not to also exclude worlds where a round square exists or where 10 is a prime number.[7] It is difficult to find a reason for which one should accept the existence of a world where a round square exists and at the same time reject the existence of a world where classical logic is true and contradiction is true as well. Just as our understanding of a notion of being round excludes being square, our understanding of the notion of contradiction excludes the possibility of classical logic being true. As long as we accept that there are worlds where round squares exist or where 10 is a prime number, there is no reason to exclude worlds such as w_1 and w_2 from our analysis of impossibilities. After all, they represent impossibilities.

A possible justification for rejecting (ii) might be that *ECQ* is a logical law, and as such it remains valid in every possible world regardless of the truth value of (5) or (6). In this way the falsehood of (5) (or (5*)) would not result in the invalidity of *ECQ* in classical logic. Nevertheless, it seems that (5) expresses exactly the same claim that is expressed in *ECQ*, so it is difficult to imagine what could be a better way of expressing *ECQ* in the natural language than (5) is. As Graham Priest pointed out: "Conditionals may not express laws

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7 Naturally one may take this as a reason for rejecting the view that there are impossible worlds. Although most philosophers do not believe in this kind of objects, the problem that we are dealing with is addressed to those who believe in a theoretical value of impossible worlds' analyses.

of logic; but which conditional holds may certainly depend on logical laws. Thus, $[A \wedge B] > A$ since $[A \wedge B]$ entails A" (Priest 2009, 330). Although the rejection of (ii) may allow one to avoid the problem that we have presented above, it may be considered to be misleading. The only way of taking *ECQ* to be true in the actual world and (5) to be false (and consequently (6) to be true) is if we consider the antecedent to be true in a world of paraconsistent logic. But as we have seen above, this is clearly *not* the trivial world, and what we are interested in is a world where classical logic is true, contradiction is true and where everything is the case, i.e., the trivial world.

It seems thus that what is left is to reject (iii). Among (i)-(iii), it is the least supported assumption of the analysis of counterpossibles in terms of impossible worlds. Compared to (i) and (ii), (iii) looks merely like a pre-theoretical intuition that is not so well supported by argument. As we know, some of intuitions are simply deceptive. Therefore, it is worth considering an analysis towards such a notion of similarity between worlds which will be consistent with rejecting the last assumption. Otherwise, we should conclude not only that the actual world is a world where classical logic is false, but also that *ECQ* is invalid in classical logic.

Surely one could argue that our investigation shows that, actually, (ii) is false. It might be argued that since validity is taken to be the truth in every possible world, then, when taking into consideration impossible worlds, (ii) has no applications anymore. This might be an interesting way of dealing with the problem that we are analyzing here; especially for classical logicians who would like to deliver an analysis of non-vacuously true counterpossibles and save the validity of *ECQ* at the same time. This may allow one to keep *DTW* as one of the guides for an interpretation of the notion of similarity. Nevertheless, what might be a justification for the rejection of *DTW* is that its problematic consequence is in some sense independent of what the correct logic of the actual world is (as (5*) and (6*) show). As such, if the dismissal of *DTW* would help to avoid it, it is worth considering such an interpretation of similarity which does not rely on this assumption.

5. The Strangeness of Impossibility Condition

The second of the rules that we are going to challenge is the Strangeness of Impossibility Condition (*SIC*). According to this condition, "any possible world is more similar (nearer) to the actual world than any impossible world" (Nolan 1997, 550). In this sense, a world where there is no woodpecker (which is a possible world) is more similar to the actual world than a world where a round square exists. Contrary to the claim of the dissimilarity of the trivial world, *SIC* is not very widely accepted, and some philosophers doubt its validity. We will join them here and argue that *SIC* should not be taken to be a guide for understanding the notion of similarity.

Let us start with an analogy. Consider three objects: a ball, a tomato and a ladder. If one asks "What is more similar to the ball? A tomato or a ladder?", most of us would probably answer "a tomato". When asked why, we can say that both have the same shape. This will make our answer correct, but only if we understood the question as "What is more similar to the ball as far as having the same shape?" But if one presents the question in a different way, e.g., "What is more similar to the ball as far as having the same nature?", the answer would be different. In this case we should say that the ladder is more similar. After all, a ladder and a ball are artifacts, while the tomato is not. This shows that it is very difficult to think about similarity *per se*. Usually, our understanding of similarity between objects depends on a chosen feature that we take to be the most important. In this sense, each time we compare objects we (either in an explicit or implicit way) focus on a given feature. Without this restriction the result of such a comparison might be misleading. Similarity understood in this way is in fact a ternary relation, S $\langle a, b, F\rangle$, i.e., object a is similar to object b because of factor (property) F. In this sense, two objects are similar with respect to property F iff they both have F. A ladder is similar to a ball because they are both artifacts, and a tomato is similar to a ball because they are both round. By analogy, being more similar (MS) is a quaternary relation MS $\langle a, b, c, F\rangle$, which states that because of factor F, object a is more similar to object b than object c is.

Consider the possible world as mentioned above where there are no woodpeckers (but where no circle is a square) and impossible worlds where a round square exists (but where woodpeckers also exist). When it comes to a lack of round squares (and presumably being possible) we can say that the former is more similar to the actual world than the latter. Nevertheless, we can also say that, when considering the number of woodpeckers, the last one is more similar to the actual world than the first one is. In this sense, the similarity between worlds depends on a chosen aspect. If the most important feature of a world is to have an adequate number of woodpeckers, and one does not care about geometrical impossibilities, then one can say that there is an impossible world that is more similar to the actual world than one of the possible worlds is.

Someone who would like to save the validity of *SIC* might argue that the most important feature of a world is whether it is possible or impossible. After all, we should consider worlds in their fundamental aspects, and logical or metaphysical possibility is one of them. Surely these are important features of a world, especially when we are dealing with an analysis of modality. By accepting this assumption, *SIC* might easily be taken to be true. Even more, it would be obviously true since it would state that when considering the feature of being possible, every possible world is more similar to the actual world than any impossible world is. Though it is difficult to argue against this claim, it is presupposed that the only important feature of a world is being either possible or impossible and, as we have seen, we do not have to compare worlds (neither any other object) only because of this feature. As such *SIC* should not be used as a guide for a proper understanding of the notion of similarity.

6. Conclusion

We believe that the above considerations give good reasons to claim that the trivial world should be taken to be more similar to the actual world than some non-trivial worlds are, and that there are impossible worlds which are (in some respects) more similar to the actual world than some possible worlds are. Because of this, both *DTW* and *SIC* should not be considered to be good guides for understanding the notion of similarity between worlds.

This conclusion raises two important questions – is it possible to deliver such an interpretation of the notion of similarity which does not rely on *DTW* and *SIC*? And if this is so, is the refutation of *SIC* necessary in order to save the validity of *ECQ* in the actual world (resp. in classical logic)? We believe that there is a positive answer to the first question. A project of such an account of the notion of similarity was delivered in Sendłak (2016). Although the interpretation that was presented in this work gives further reasons to dismiss *SIC*, we believe that *SIC* is independent of *ECQ* and *DTW*. After all, both w_1 and w_2 are impossible worlds, and as such *SIC* has no important application to determine which of these is closer to the actual world; it applies to them in exactly the same way.

Nevertheless, as we argued in Sendłak (2016), regardless of the problem of the validity of *ECQ,* one can indicate the reasons for a refutation of *SIC*. We believe that this modification in the interpretation of the notion of similarity (i.e. refutation of both *SIC* and *DTW*) helps us better understand the use of counterpossibles in general.[8]

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[8] Earlier versions of this material were presented in Bratislava (Slovak Academy of Science) at "Issues on the Impossible Worlds" in May 2014, in Warsaw (University of Warsaw) at "Philosopher's Rally" in July 2014, in Ghent (Centre of Logic and Philosophy of Science) at "Entia et Nomina" in July 2014, in New York at Graham Priest's graduate student seminar in November 2014 (CUNY Graduate Center)), and in Budapest at "Ontology and Metaontology" in July 2015 (Central European University). I am grateful to the participants of these meetings for their helpful comments and discussions. I would like to thank to the anonymous reviewers for this volume for their comments concerning the earlier versions of the paper.

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