MODAL REALISM AND PHILOSOPHICAL ANALYSIS:
THE CASE OF ISLAND UNIVERSES

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The paper outlines and immediately discusses the so-called 'soft' impossibility, i.e., non-logical impossibility generated by modal realism. It will be shown that although in a particular case genuine modal realism, straightforwardly applied, deems impossible a proposition that other philosophers have claimed to be (intuitively) possible, there is a variety of methodologically acceptable moves available in order to avoid the problem. The impossibility at issue is the existence of island universes. Given the Lewisian analysis there are three points at which we might try to square genuine modal realism with such a controversial and problematic claim of (im)possibility, namely: a) the contraction of our pre-theoretical opinions about possibility, b) the revision of some Lewisian definitions and/or c) the extension of our ontological commitments. I shall look at each of these approaches applied to the problematic case.

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Introduction: Island Universes are Possible. Modal realism is the thesis that the world we are part of is but one of a plurality of casually and spatiotemporally isolated individuals (see Lewis 1986, Andreanský 2009). If that is so the problem arises as, it is claimed, there *could* have been co-existing but completely disconnected spacetimes – *island universes*. For example, Bigelow and Pargetter (Bigelow and Pargetter 1990) think that it is a perfect epistemic possibility that reality could contain spatiotemporally disconnected regions, as there is nothing that would contradict the idea. Moreover, objections from arbitrariness and counterintuitive truth values of several counterfactuals only strengthen the opinion that island universes are possible.[1] Takashi Yagisawa's objection from physics seems to highlight the idea, as 'we simply do not know enough about the spatiotemporal characteristics of the universe to conclude that it does or does not [contain island universes]' (Yagisawa 1992, 86). Finally, Philip Bricker formulates an argument according to which island universes are (if not physically possible, at least) metaphysically possible. Moreover, he adds that the possibility is not backed by philoso-

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[1] For instance, let have a conditional If Jane hadn't stood in any temporal relation to us, then Jane would not have existed. Since falsification of the counterfactual requires there to be a world in which the antecedent is true – the *existence* of counterpart of Jane – and the falsehood of the consequent (thus nonexistence of the counterpart), and given Lewis's definition of a world, genuine modal realist is committed to the truth of the counterfactual. See Divers (2002, 93-97).

phical opinions alone, but by 'general principles of plenitude applied to ordinary individuals' (Bricker 2001, 39). Assuming (and modifying) Hume's denial of necessary connections between distinct existences, Bricker finds the idea of spatiotemporally disconnected individuals not only coherent, but philosophically appealing.

Now, given Lewis's account of de dicto possibility:

(P)   It is possible that P *iff* there is a world, w, such that at w, P

and his definition of a possible world:

(W)   x is a world *iff* x is a maximal mereological sum of *spatiotemporally interrelated* individuals

it follows that it is not possible that there exist disconnected spacetimes.

The reason why this issue bears on the question of the ontology of impossibilia is that Lewis accepts the existence of individuals that have disjoint spacetimes as parts. The problem then is that by the standard definition of what it is for an individual to be possible such a thing would have to be part of a world. But on Lewis's theory, this thing would not be part of a world. So the consequence that such an individual exists but is not possible is unreasonable.

Opinion Contracted. One way out of the troubles with the possibility of island universes is to deny not only their actual existence, but their possible occurrence as well. Of course, there is a methodological appeal saying that we ought to be very reluctant to make any revision at the level of pre-theoretical opinions whatsoever. Lewis himself admits that he denies the opinion, although he would rather not to.

Lewisian can argue that the rejection of the possibility – if really necessary – does not present a *crucial* revision of other pre-theoretical opinions by drawing a principled distinction between (at least) two kinds of pre-theoretical opinions. On one side, the intuitive possibility of island universes is clearly *isolated* from the rest of our opinions and, apparently, does not play a central part of our modal thinking. On the other side, the existence of, say, chairs, tables and dogs is *central* to our reasoning about (not only) modal matters and their denial would cause crucial revisions of other pre-theoretical opinions.

For instance, if we denied such a global pre-theoretical opinion that there are chairs (whatever their metaphysical nature is), we'd radically change the theory. Of course, Lewis thinks, we are trying to *improve* a theory about what there might be, that is, we are trying to improve the unity and economy of the total theory. But at the same time we are trying to improve *that* theory (Lewis 1986, 134). It is pointless to build a new 'chairless', 'tableless', or 'dogless' theory, because the opinions that there are chairs, tables and dogs are too pervasive and too central as to be violated. It would be just unreasonable to believe the resultant theory even if the theory was unified and economical. But the situation with such an opinion as the possibility of island universes is different. Whether we admit the possibility or not does not seem, at least to Lewis, to be a move that would play a

fundamental role in the *total* theory.[2]

Moreover, Lewis offers passable substitutes for the possibility. What we really mean by disconnected spacetimes, Lewis argues, can be something quite different. In particular, we can mean an extra dimension in a big world; the world-like parts sharing a common spacetimes; time having the metric structure not of the real line, but rather of many copies of the real line laid end to end; or even time having the metric structure of the real line, yet with infinitely many world-like epochs one after the other (Lewis 1986, 72). In other words, in terms of the well defined conception of analysis, when we think that it is possible that P, what we really think may, on reflection, turn out to be something different, namely P*, when P stands for the possibility of island universe, while P* represents the possibility of something else.

Definitions Revised. Definitions specify meanings and senses of theory's crucial notions and fix truth-conditions for sentences involving both pre-theoretical terms and theoretical terms. Thus, given a set of pre-theoretical opinions and certain ontological commitments, a chain of definitions beginning with the data and, next, introducing terms of the theory, provide an analysis of the opinions in a following way:

(Data)	It is possible that there is a philosophizing cat.
(Definitions)	It is possible that P *iff* there is a possible world, w, such that at w, P. x is a possible world *iff* x is a maximal mereological sum of spatiotemporally interrelated individuals.
(Ontology)	There (unrestrictedly) exists a concrete mereological sum of spatemporally interrelated individuals, w, such that at w, there is a philosophizing cat.[3]

One can, however, find Lewis's definitions unsatisfactory. Consequently, a modification of some definitions could do the job of improving the total theory without contraction of the opinions and, moreover, leaving the ontological commitments untouched.

Definition of a World Revised. Apparently, one of the reasons why Lewis's theory must reject the possibility of island universes is the very definition of a world, going hand in hand with the definition of possibility. If the world is a maximal mereological sum of spatiotemporally interrelated individuals and possibility is identified with a truth in a possible world, it is only to be expected that no world contains spatiotemporally isolated

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[2] As Lewis writes: '… a theory cannot earn credence just by its unity and economy. What credence it cannot earn, it must inherit' (Lewis 1986, 134).

[3] Note, however, that the example is rather simplified. The ontological component is supposed to provide via principles like recombination and summing a variety of individuals among which some will satisfy the conditions (given by a network of definitions) for being a philosophizing cat. The ontological component itself will be full of high-level generalizations about what there is and will not mention cats. Cf. Divers (manuscript: 4).

parts. But why do we need the worlds in the first place? Why could we not omit the definition of a world and improve thus the overall theory?

The alternative proposed by Yagisawa (Yagisawa 1992) suggests that there is no need for 'special' kinds of individuals such as worlds in the Lewisian ontology. Notoriously, worlds play in Lewis's theory two roles, namely the role of truth-relativizer and the role possibilia-localizer. For an individual to be a possibilia-localizer, Yagisawa thinks, it is not necessary for it to be a world. Since localizing is still a relative matter depending on a context – a possible talking donkey does not exist in a maximal mereological sum of individuals only, but also in a possible country, on a possible planet, in a super-super-super cluster of galaxies etc., – we can localize a talking donkey without mentioning a possible world in a similar way as we can localize a beer in the fridge without mentioning (and even meaning) the actual world. Consequently, all we need when localizing possibilia is a variety of (not necessarily maximal) mereological sums of individuals having the localized individuals as parts. Dispensing with worlds as possibilia localizers, Yagisawa concludes, is nothing but harmless ignorance of certain "curves" (in the process of nested relative localization) in the logical space.

The second role possible worlds play is the role of truth-relativizers. Again, Yagisawa argues that worlds are not needed here, because

a)   (ordinary as well as extraordinary) truth is defined relative to *the universe of discourse*

b)   the universe of discourse varies from one context of utterance to another

c)   we lose nothing in our truth definitions by using much more (even overlapping) universes of discourse rather that maximal non-overlapping universes of discourse

d)   counterpart relation and accessibility relation are not different.[4]

All Yagisawa requires is Lewis's original ontology, that is individuals, sets, the unrestricted mereological summation and the principle of recombination. Of course, that is not to deny that there are such things as closed sums of spatiotemporal relata. The proposal is that we assign no special theoretical role to those individuals.

As we can see in Yagisawa's proposal, the definition of a world – (just) a mereological sum of individuals – and the definition of (ordinary) possibility as a truth in some mereological sum of individuals enables him to accommodate the possibility of island universes. Since to be possible means to be true at a mereological sum of individuals and there *is* a mereological sum of spatiotemporally *isolated* individuals, island universes are possible, full stop.[5]

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[4] Here, Yagisawa indicates Lewis's use of counterpart relation and accessibility relations. However, I do not need further details for my purposes so I will not go into the details.

[5] It goes as follows. Take two Lewis worlds w and v. Now, by unrestricted summing there is an individual (sum) z = w+v. According to the Lerwisian ontology there is such a thing. But now, by the new

However, the gains of the proposal have to be with its costs. In particular, Lewis can (and even must) agree with Yagisawa that if there is a head in one world and a body in another, there is a sum of the head and the body. But to say that the resultant aggregate of individuals is a world means that the head is a part of infinitely many possible worlds (because it is a part of infinitely many mereological sums). And that is, according to Lewis, a bad outcome[6]. For instance, consider a person that has five fingers, but could have had six. Supposing that representation de re works by transworld identity of concrete individual, there is one and the same individual existing at two different possible worlds and having five as well as six fingers on her hand. Supposing also, that the property of 'having five fingers' and the property of 'having six fingers' are *prima facie* accidental intrinsic properties – properties had by individuals in virtue of the way the individuals are in themselves - and, a fortiori, the property of 'having five fingers on a hand' excludes the property of 'having six fingers on the same hand' – there is no change for an individual to have five as well as six fingers on her hand.

Another (rather unwanted) consequence of Yagisawa's proposal concerns conceptual applications of possible worlds. Even if arbitrary individuals (sums) can play the role in the definition of possibility that is not to say that they can adequately be substituted for worlds in all definitions. The reason is that the sums can be thought to be too indiscriminate as to play the required worlds' roles in the conceptual analysis. For, when we consider the whole network of definitions it looks like an appeal to the notion of a world is not dispensable after all. As Divers's example demonstrates

'…the concept of causation is analysed in terms of counterfactuals, which are analysed in terms of truth-values of material conditionals across spheres of proximate worlds. In that 'truth-relativizer' capacity perhaps worlds are, as Yagisawa suggests, dispensable. However, worlds re-enter the picture since proximity of relevant 'truth-relativizers' is analysed in terms of similarity and, crucially, similarity of laws in particular, with laws analysed, in turn, in terms of worlds' (Divers 2002, 104).

In other words, although we can grant the plausibility of Yagisawa's proposal in the light of semantic and ontological ambitions of modal realism – we can get by with sums of individuals playing the roles of truth-relativizers and possibilia-localizers, respectively – the concept of a world 'stands as a major obstacle to demonstrating comprehensive dispensibility'.

Definition of Possibility Revised. According to the standard Lewisian definition of possibility, in terms of what is the case in Lewis worlds, it is not possible that there be

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definition of possibility, the existence of that individual is sufficient for it to be possible that there are disconnected spacetiemes. For two such spacetimes exist at that sum since they are parts of that sum. And for them to exist at a sum is for the co-existence of such things to be possible.

[6] See Lewis (1986, 198-209).

island universes. We considered the strategy of changing the definition of "world" in order to square Lewis's theory with the possibility of island universes. But that is not the only option. Instead of the "world" definition we can modify the definition of 'possibility'. Again, several approaches were proposed, including a class version of amended analysis (Bricker 2001), a plural quantifier version (Bricker 2001), an aggregate version (Bricker 2001) and extraordinary modalizing (Divers 1999).

To begin with, the class version of the amended analysis of modality takes for granted that possibilities are not to be represented by single Lewis's worlds, but by *classes* of them. Here, the domain of a class is the union of the domains of the worlds at issue and any (quantified) sentence, when evaluated relative to the class, will have its quantifier restricted to the union (Bricker 2001, 17). Thus, instead of traditional principle

(P)   It is possible that P *iff* there is a possible world, w, such that at w, P

the analysis has the following form:

(CV) It is possible that P *iff* there is a class of worlds, c, such that in c, P

Consequently, although it is not true that there are island universes in any single Lewis's world – and thus it is not possible that there are island universes – it can still be true (and in fact it is true) that there are island universes in a class of (at least) two Lewisian worlds.

The second option – the plural quantifier version – says that there is a singular (Lewisian) as well as plural quantification over possible worlds. According to this position, it still holds that

(P)   It is possible that P *iff* there is a possible world, w, such that at w, P

but when extraordinary cases occur, we can 'expand' the possibility localizer and include more than one world into the evaluation of the problematic sentences. Namely

(PK)   It is possible that P *iff* there is a possible world, w, or possible worlds $w_1 \ldots w_z$, such that at w or at $w_1 \ldots w_z$, P

It should be noted that the truth values of extraordinary modal claims (like those about island universes) do not differ between class version and plural quantification version as to what is possible. However, although the versions are extensionally equivalent – in particular, both of them guarantee the possibility of island universes – they do the job in different ways. While the former version commits its proponent to the existence of classes (thus extends its ideology), the latter one prefers a broader definition of possibility without a commitment to other (messy) entities.

The aggregate version does not mess up with classes on one side – we need not in-

volve here quantification over classes nor any quantification other than standard singular quantification – sustains the singular quantification, on the other. Given the unrestricted summation, for any number of worlds there exists an aggregate (or mereological sum) of those worlds. Namely

(AV)   It is possible that P *iff* there is an aggregate of worlds, a, such that in a, P.

Importantly, the common feature of all the above proposals is that they propose to liberalize the range of possibility localizers. It still holds that something is possible if and only if it obtains 'somewhere', where the localizer at issue is any sum of individuals, class of worlds or an aggregate of them. But while Yagisawa considers any mereological sum as being able to play the role of possibility localizer, Bricker restricts himself to those aggregates that consist of Lewis's worlds only. This, of course, enables him to avoid the unintuitive consequences and, subsequently, sustain the applications of the overall theory.

Finally, we can consider a modal operator in (P) as redundant. Since extraordinary claims are (by definition) about transworld entities existing in no possible world, an analytic hypothesis for the analysis of extraordinary individuals (like the possibility of island universes) could (or rather should) be slightly modified. As Divers points out, whenever the possibility operator expresses a non-triavial function on quantificational sentence, the scope of (formerly) world-restricted quantifier is always altered. But in cases where the quantifier were *not* formerly restricted – the very sentences that express transworld content – the extraordinary modal expression does not have an effect of such an alteration of the scope (Divers 1999, 228). Thus, the modal operator is vacuous and the definition of possibility has the following form:

(AM)   It is possible that P *iff* P.

Again, that strategy is able to answer affirmatively the question: 'are island universes possible?', because the possibility in (AM) is identified with *un*restricted existence. Provided that there is (unrestrictedly speaking) a plurality of worlds, there are island universes as well. Therefore, unlike Bricker, Divers's strategy is to consider existential quantifier within modal operator as having restricted as well as unrestricted interpretation. If we think that certain modal claim is true but restricted (or ordinary) interpretation does not allow for it, we can give up all the restrictions put on it, and, due to a modification of the definition of possibility, 'make' it true. Consequently, while one of the features of restricted interpretation is the possibility localizer, the unrestricted interpretation of existential quantifier explains the locution of the localizer away.

To sum up, Lewis's analytic theory is interestingly flexible and, as it seems, able to accommodate the (im)possibility of island universes. Of course, some moves have to be made in order to handle it. One move is to change some definitions – the definition of "world" or the definition of "possibility". The other is to give up some definitions completely and fix the consequences – do another move concerning the definitions – some-

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where else. One way or the other, the changes made do not affect the ideology of the theory (with the exception of class version) and, a fortiori, do not extend or contract the domain of everything what there is.

Ontological Base Extended. The last resort is metaphysical. If we still insist that island universes are possible and also insist that the above modifications are inappropriate, we can expand the ontological base, namely the ideology of modal realism. According to that move, we can sustain our pre-theoretical opinion that island universes are possible, but at the cost of expanding our ontological commitments. For instance, we can postulate primitive relation between parts of the same world. Lewis explicitly mentions (and immediately denies)[7] the option, but it does not mean that it's not compatible with the well defined conception of analysis.

On one side, an account of a world as a sum of individuals connected by some primitive (other than spatiotemporal) relation would, trivially, dispenses with the impossibility of there being spatiotemporally isolated individuals.[8] In any case, if we defined a world as a sum of individuals such that every part stands in some worldmate (other than spatiotemporal) relation to every other part (and to nothing else), the proposition

(IU)   It is possible that there are island universes

will turn out to be true, even if it still holds that

(P)   It is possible that P *iff* there is a possible world, w, such that at w, P.

It only suffices to modify the definition of a world by including primitive worldmate relation:

(W')   x is a world *iff* x is a maximal sum of *primitively* interrelated individuals.

In sum, the problem of the (im)possibility of island universes can (if necessarily) be solved at any level of modal realism. We can contract our pre- theoretical opinions, leaving thereby its definitions and the ontological postulates untouched. Also, we can modify the definitions without interference of our pre-theoretical opinion and ontological commitments or, finally, extend the ontological commitments (either ontology or ideology). What matters, however, is that each of the moves involves some sacrifice of conservativeness on one side, some theoretical complications on the other.

Conclusion. All in all, I hope I have shown that the Lewisian well defined conception of analysis enables, in principle, there to be various modifications as to accommodate

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[7] See Lewis (1986, 72).

[8] Again, Lewis considers the option. However, for him to reject the possibility of island universes is 'more credible' than positing primitive worldmate relation(s).

various impossibilities. Although I think of the case in hand – the (im)possibility of island universes – as an isolated phenomenon, I hope that the moral of the paper is clear. If we decline to accept consequences of a theory we prefer we are still left with the choice of modifying one of its constituents in its structure.[9]

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[9] Whether the same can be said about logical impossibilities is more disputable. See Vacek (2013) for some proposals.