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Folk Moral Semantics, Moral Naturalism, and Moral Descriptivism

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Received: 29 October 2024 / Accepted: 28 January 2026

Abstract: Whether morality exists entirely as part of the natural world depends at least in part on what we mean by “morality.” Using analysis and formal logic it can be shown that, if one adopts a certain colloquial moral semantics whereby “is” and “ought” are different relations with respect to the type of ought that morality uses, it leads to deontic morality not being part of the natural world (at least not entirely so), thereby leading to a folk moral semantics argument against moral naturalism (or for moral non-naturalism). A similar argument can be used for arguing that, if one adopts the view that moral facts are natural facts, they should also adopt the view that moral facts are descriptive facts, i.e., that moral naturalism implies moral descriptivism.

Keywords: Moral naturalism; moral non-naturalism; moral descriptivism; the is/ought gap; moral semantics; normativity objection.

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Introduction

Moral descriptivism is the view that “moral facts are identical to descriptive facts.” (Heathwood 2009, 85) While some moral naturalists are moral descriptivists, the idea that moral naturalism implies moral descriptivism is not universally agreed upon. One could be a moral naturalist without being a moral descriptivist.

A closely related issue is moral semantics and deontic moral normativity. The folk sense of moral normativity, while perhaps not as sophisticated as that of the moral philosopher, at least sees a distinction between statements about what is and statements about what ought to be. Examples of the former include “Bismuth has more protons than silicon” and “Sue the infant is in pain.” Deontic moral statements, such as “It is morally wrong for a man to torture an infant just for fun,” are instances of the latter. One could propose a revisionist semantics for normative terminology, as for example Peter Railton (1989) did for moral axiology, whereby the reformed definition differs from the original. A revisionist moral semantics might well lead to moral facts being natural facts, but a less revised moral semantics closer to folk moral normativity might not, particularly if such folk moral semantics sees the “is” and the “ought” as entirely different relations as far as the moral ought is concerned.

This paper presents two key arguments: (a) if one uses a colloquial moral semantics for deontic morality, viz. a real distinction between “ought” and “is” such that it is not the case that the moral ought has only descriptive characteristics,¹ then this leads to deontic morality not being part of the

¹ Note that this moral semantics leaves it open for the moral ought to have *some* descriptive characteristics. For example, one might think that the moral ought necessarily has some purely descriptive quality (perhaps a prudential one), in addition to having a not-purely-descriptive component. On that note, one must be careful to distinguish between sense adequate and intensionally adequate definitions. For example, “water is H₂O” works as an intensionally adequate definition but not a sense adequate one (we knew of water long before we discovered it is H₂O). Similarly, the not-purely-descriptive moral ought semantics allows for “An action is morally obligatory if and only if it has this descriptive quality *Q*” being an intensionally adequate definition (i.e., no metaphysically possible counterexamples to the biconditional) but not a sense adequate one, since a defining characteristic of the moral ought is that

natural world (at least not entirely so); (b) I will argue along similar grounds that moral naturalists ought to be moral descriptivists. For the sake of precision, I will delineate what I mean by descriptive facts, morality, and what it means for morality to be natural (and non-natural) before presenting these two arguments.

2. Defining Terms

2.1. Descriptive Facts, Properties, Etc.

One relation between language and facts is the existence of statements that state what the fact is, using something like Tarski's (1972, 343-344) disquotation concept of truth for a statement.² Just as "snow is white" is true if and only if snow is white, the statement "snow is white" states the fact that snow is white. Similarly, in Parfit's (2011, 266) lingo, an irreducibly normative fact is one that "cannot be defined or restated in non-normative terms." Since irreducible normativity is essentially defined in terms of what it is not, it becomes difficult to delineate precisely what it is without such negative predication. Henry Sidgwick (1981, 32) even goes so far as to say that the fundamental notion behind the moral sense of "ought" is "too elementary to admit of any formal definition." Parfit (2011, 265) helps however by giving examples of normative and non-normative terms. Examples of the latter include "kill," "unexpected," "cause," and "electric." When Parfit gives examples of normative terms he includes both deontic terminology (e.g., "ought," "right," "wrong," and "duty") and axiological terminology (e.g., "good," "bad," and "mediocre").

Very roughly, a truth-apt statement uses purely "descriptive language" just in case its language makes claims about what is without making claims about what ought to be; e.g., "As a matter of practical necessity, Jill needs

it does not have *only* descriptive qualities. This moral semantics in which it is not the case that the moral ought has only descriptive characteristics refers to sense and not merely intension.

² This does not mean that facts are *identical* to true statements. Moreover, this article does not take sides about what a fact exactly is (is it merely a truth-bearer that is true? is it merely a state of affairs that obtains?).

to study to do well in school.” With Tarski disquotation in mind, we can at least as a first approximation define the term “descriptive” in such a way that any fact that can be defined or restated entirely in non-normative terms is a sufficient (though not necessary) condition for that fact to be descriptive. Why is it not a necessary condition? People can have beliefs about deontic normativity even when facts about those beliefs are descriptive. For example, the statement “Sally believes that people ought to be kind” is descriptive since the language makes claims about what is without making claims about what ought to be, even though the statement might not be able to be restated entirely in non-normative terms. Language depicting raw sensory experiences is also descriptive language, and thus empirical facts are descriptive facts. Language that depicts only the physical interactions of physical entities (e.g., collisions of protons) is likewise descriptive language, and facts that can be fully characterized in such language are consequently descriptive facts. We can say that a descriptive fact, property, predicate, etc. is one where what it is can be stated entirely in descriptive language.

In line with how “descriptive” is being used for descriptive facts, properties, and so forth, say that a “descriptive ought” is any ought such that what it is can be stated entirely in descriptive language. A paradigm example of a descriptive ought is the hypothetical ought of Kant’s (2012, 28) hypothetical imperative, which describes a possible action that is practically necessary to accomplish some goal; e.g., when “If Jill wants to do well in school, she ought to study” just means something like “As a matter of practical necessity, Jill needs to study to do well in school.”

A rough and ready definition for moral naturalism (also called “ethical naturalism”) is the view that moral facts and properties are natural facts and properties. Thus, with the above analysis for what it means for a fact or property to be descriptive (viz. what it is can be stated entirely in descriptive language), some people’s intuitions might lead them to believe that it is a given that moral naturalism implies and requires moral descriptivism (and more generically, that anything natural would also be descriptive), but such intuitions are not given to everyone. A view that Jonathan Dancy (2006, 127) calls “one-term naturalism” says that every “normative fact is a natural fact, whether or not there is a descriptive way of capturing that

fact in addition to the evaluative way.” This of course would include moral normative facts. Speaking in defense of ethical naturalism, Nicholas L. Sturgeon (2003, 537) says that ethical naturalism leading to the assumption that moral facts and properties “can be fully characterized in entirely non-moral terms” is “not obvious at all, but highly questionable: possibly false, and at the very least requiring defense.” Such a view of ethical naturalism would of course suggest that it is highly questionable that moral naturalism implies moral descriptivism.

In §4 I will argue that moral naturalism does indeed imply moral descriptivism, but before getting to that I will give an analysis of what it is to be “natural,” describe a colloquial conception of morality that I will refer to as folk moral semantics, and argue that this folk moral semantics leads to deontic morality being non-natural. The Folk Moral Semantics Argument in §3 will be similar to the argument for moral naturalism implying moral descriptivism in §4.

2.2. Folk Moral Semantics

In contrast to the descriptive ought, a defining characteristic of folk moral semantics is a real distinction between “ought” and “is” such that it is not the case that the moral ought has only descriptive characteristics. Thus on folk moral semantics, facts of what the moral ought is will not be comprised of only descriptive facts. So some oughts are not descriptive oughts; they are prescriptive in a way that is not purely descriptive. Call these not-purely-descriptive oughts “Humean oughts,” from David Hume’s is/ought distinction, in which someone saying “You should not set cats on fire” might be using this sort of ought. When Hume (2000, 302) famously mentioned the apparent difficulty of deducing an “ought” from an “is” in the final paragraph of book 3, part 1, section 1 of *A Treatise of Human Nature*, not only did he say that the “ought” is an “entirely different” relation from the “is,” he specifically had the moral ought in mind when he did so. For my is/ought dichotomy, descriptive facts/properties/etc. are the “is” and Humean oughts are the “ought.”³

³ As a disclaimer, I am not saying the two categories of this dichotomy are mutually exhaustive; e.g., one might think that axiological facts fit neither category

Moral rightness and moral wrongness pertain to moral obligation. To illustrate, an action *A* is morally wrong for a person *S* only if *S* morally ought not do *A*, and thus facts that some specific acts are morally wrong (if any exist) are examples of deontic moral facts. Notably though, the moral ought also seems to have something to do with moral values; e.g., one morally ought to value justice.

To simplify, I will focus on deontic morality in arguing for folk moral semantics leading to moral non-naturalism. Recall that folk moral semantics is such that it is not the case that moral oughts have only descriptive characteristics; i.e., moral oughts are Humean oughts. We can also describe folk moral semantics using the Moorean sense of a closed question from G. E. Moore's (1993, 66-69) famous Open Question Argument, in which a closed question is one where the meaning of the terms suffices to answer the question (e.g., "I know he is a bachelor but is he married?"), and an open question is the opposite of a closed question. To simplify matters slightly, I shall use something like "*P* is a closed question" to mean that whether *P* is true is a closed question with the answer in the affirmative. For example, on folk moral semantics it is a closed question that moral oughts do not have only descriptive characteristics.

It is worth noting that moral oughts being Humean oughts would potentially help fulfill the categoricity desideratum of morality. (Jordan 2011) That is, being reason-giving for people independently of what one's goals are, assuming our conception of "reason" is such that a fact *F* making choice *C* proper and appropriate is a sufficient condition for *F* being a reason to do *C*. In this case, the fact that one ought to do *C* in the Humean sense

(though by my lights, a moral value would be something that one *ought* to value in at least some conceivable circumstance, else it would not be a moral value). Nor am I saying that the line dividing the two categories is necessarily perfectly sharp, though in at least some instances we can say with reasonably high confidence that something fits a certain category. As analogy, the line between "healthy" and "unhealthy" is not perfectly sharp, but we can still in some cases categorize instances of an unhealthy body (e.g., one riddled with severe disease) and a healthy one (e.g., physically fit with nothing medically wrong) with reasonably high confidence. Similarly, I think one can argue that natural facts are descriptive facts with reasonably high confidence (see §2.3, §3, and §4) even if my is/ought dichotomy is not perfectly sharp.

would make it proper and appropriate to do *C*, and thus a Humean ought would be reason-giving. If there are cases where one ought to do *C* in the Humean sense that hold independently of one's goals (as would be the case when the Humean ought is used in moral objectivism, the view that there are moral truths that hold independently of human perceptions and attitudes towards those truths), such cases would fulfill the categoricity desideratum. In contrast, hypothetical oughts do not fulfill this desideratum, and it is difficult to think of an ought that fulfills the categoricity desideratum that is not a Humean ought.⁴

2.3. Natural and Non-natural

There are a number of ways to define the distinction between a fact that is “natural” and one that is “non-natural.” Indeed, Jonathan Dancy (2006, 122) notes that the debate between ethical naturalism and ethical non-naturalism is “vitiating by the fact that there is no agreed account of what it is to be natural.” Still, one can find similarities among some definitions. Russ Shafer-Landau (2003, 19, 55) defines a natural fact as “one whose existence can be confirmed by the best natural or social scientific theories,” later describing ethical naturalism as the view that “moral facts are a species of scientific facts, discoverable in all the ordinary ways, as motivating and as normative (or not) as ordinary facts.” Similarly, Nicholas L. Sturgeon (2006, 92) describes ethical naturalism as the view that moral values and obligations “fit into a scientifically based, naturalistic view of the world” with moral properties being “of the same general sort as properties investigated by the sciences.” My approach will be similar to that of Robert Adams (1987, 145) who defined non-natural facts as facts that “cannot be stated entirely in the language of physics, chemistry, biology, and human or animal psychology.”

What does this mean exactly? It does not, presumably, mean something like whatever those disciplines happen to be studying, such that if science

⁴ Though one might think ethical naturalism could have something “close enough” or “good enough” for a kind of authoritative (even if somewhat different) normative desideratum. See (Väyrynen 2021).

were changed to study metaphysical matters then natural facts would include metaphysical facts. Rather, it means the type of language describing the sorts of observations, facts, etc. that those fields study, with the purview of the disciplines being as we understand them currently (or at least as of this writing). For example, physics deals with the constituents of the physical world (space, time, matter, etc.) and the physical interactions of these constituents (e.g., particles of like charges repelling) and the “language of physics” is that type of language that refers to such things. Language can evolve and new terms introduced – such as the word “quark” coined in the twentieth century – but the *type* of language remains the same insofar as the discipline’s purview does not change (e.g., the realm of physics still being physical constituents and interactions thereof). The language of physics will be nothing more than that type of language which points to the types of observations, facts, etc. that physics studies, and examining the language of physics gives us a more concrete idea of what sorts of facts those are. The same goes *mutatis mutandis* for the languages of the other natural sciences.⁵

Similarly, examining the language of psychology helps us understand that psychology (by which I mean animal and human psychology) studies descriptive facts of behavior, the mind, and the mind’s functions. (Should someone have a different conception of what psychology is for whatever reason, we can consider this a stipulative definition of psychology for purposes of this paper, such that facts of psychology refer only to descriptive facts of behavior, the mind, and the mind’s functions.)

Borrowing largely from Adams then, I will say that a “natural fact” is any fact such that what it is can be stated entirely in the language of psychology and the natural sciences. The rubric of the natural sciences (we may stipulate) includes the entire physical realm, so that any fact exclusively about the physical realm will be a natural fact. More generically, a natural fact, property, relation, quality, etc. is such that what it is can be described entirely in the language of psychology and the natural sciences.

⁵ At least, this is what I mean by “language of the natural sciences,” viz. it is that type of language that points to the sorts of observations, facts, etc. that the disciplines study, even if Adams had something different in mind (though I suspect Adams had at least something very similar in mind).

3. A Folk Moral Semantics Argument against Moral Naturalism

What I will call the Folk Moral Semantics Argument is essentially a version of the Normativity Objection against moral naturalism. The Normativity Objection is a class of objections claiming that facts of moral normativity are, to borrow David Enoch's phrase, "just too different" from natural facts. (Enoch 2011, 4) (Parfit 2011, 324-327) Moore's Open Question Argument, in which it is an open question whether a morally positive axiological fact is identical to a natural one, is one version of the Normativity Objection. The Folk Moral Semantics Argument is in one sense the opposite of Moore's because it focuses on there being a certain type of closed question rather than an open one vis-à-vis moral normativity; viz. it is a closed question that moral oughts do not have only descriptive characteristics. Before getting to the premises of the Folk Moral Semantics Argument, some predicates and propositional variables need to be defined.

Recall that something is "natural" just in case what it is can be stated entirely in the language of psychology and the natural sciences; and that a descriptive fact, property, predicate, etc. is such that what it is can be stated entirely in descriptive language. With those definitions in mind, we can use the following predicates:

- $D_L(x)$ = What x is can be stated entirely in descriptive language.
 $N_L(x)$ = What x is can be stated entirely in the language of psychology and the natural sciences.

One definition of moral naturalism is that moral facts and properties are natural facts and properties, but not everyone who affirms morality's existence necessarily agrees that there are such things as moral properties. (Byerly 2018) What exactly counts as a "property" is itself a matter of dispute and may depend in part on what exactly one means by "property." We can sidestep such concerns by using a placeholder. Let the predicate $A(x)$ be a generic placeholder for x being a fact, property, relation, quality, etc. For example:

- $N_L(x) \wedge A(x)$ = x is a natural fact if $A(x)$ means x is a fact.
 $N_L(x) \wedge A(x)$ = x is a natural property if $A(x)$ means x is a property.

$D_L(x) \wedge A(x) = x$ is a descriptive fact if $A(x)$ means *x is a fact*.

As handy shorthand, we can use these definitional equivalences for an arbitrary x :

$$N_A(x) \stackrel{\text{def}}{=} N_L(x) \wedge A(x)$$

$$D_A(x) \stackrel{\text{def}}{=} D_L(x) \wedge A(x)$$

For example, if $A(x)$ means that x is a property then $N_A(x)$ means that x is a natural property (i.e., a property that exemplifies $N_L(x)$), and if $A(x)$ means that x is a fact then $D_A(x)$ means that x is a descriptive fact (i.e., a fact that exemplifies $D_L(x)$).

We can let $M_A(x)$ be our deontic morality predicate such that the following is true:

$M_A(x) = x$ is a deontic moral fact if $A(x)$ means *x is a fact*.

$M_A(x) = x$ is a deontic moral property if $A(x)$ means *x is a property*.

The formal definition of $D_A(x)$ allows us to derive the following:

- | | | |
|-------------------|--|--|
| (1 _D) | $D_L(a) \wedge A(a)$ | conditional proof assumption |
| (2 _D) | $D_A(a)$ | 1 _D , definitional equivalence |
| (3 _D) | $(D_L(a) \wedge A(a)) \rightarrow D_A(a)$ | 1 _D -2 _D , conditional proof |
| (4 _D) | $\forall x[(D_L(x) \wedge A(x)) \rightarrow D_A(x)]$ | 3 _D , universal generalization |

Call (4_D) theorem TD. The formal definition of $N_A(x)$ allows us to derive the following:

- | | | |
|-------------------|--|--|
| (1 _N) | $N_A(a)$ | conditional proof assumption |
| (2 _N) | $N_L(a) \wedge A(a)$ | 1 _N , definitional equivalence |
| (3 _N) | $N_A(a) \rightarrow (N_L(a) \wedge A(a))$ | 1 _N -2 _N , conditional proof |
| (4 _N) | $\forall x[N_A(x) \rightarrow (N_L(x) \wedge A(x))]$ | 3 _N , universal generalization |

Call (4_N) theorem T_N. Alternatively, we might merely want to say that $N_L(x) \wedge A(x)$ is a *necessary* condition for x to be a natural fact/property/relation/etc. in which case (4_N) will serve that purpose as well.

With F representing *Folk moral semantics (and thus the Humean ought)* is used for deontic morality, the Folk Moral Semantics Argument goes as follows, where (1) is theorem T_N and (3) is theorem T_D:

(1)	$\forall x[N_A(x) \rightarrow (N_L(x) \wedge A(x))]$	
(2)	$\forall x[N_L(x) \rightarrow D_L(x)]$	
(3)	$\forall x[(D_L(x) \wedge A(x)) \rightarrow D_A(x)]$	
(4)	$F \rightarrow \forall x[M_A(x) \rightarrow \neg D_A(x)]$	
(5)	$N_A(a) \rightarrow (N_L(a) \wedge A(a))$	1, universal instantiation
(6)	$N_A(a)$	conditional proof assumption
(7)	$N_L(a) \wedge A(a)$	5, 6, <i>modus ponens</i>
(8)	$N_L(a)$	7, conjunction elimination
(9)	$N_L(a) \rightarrow D_L(a)$	2, universal instantiation
(10)	$D_L(a)$	8, 9, <i>modus ponens</i>
(11)	$A(a)$	7, conjunction elimination
(12)	$D_L(a) \wedge A(a)$	10, 11, conjunction introduction
(13)	$(D_L(a) \wedge A(a)) \rightarrow D_A(a)$	3, universal instantiation
(14)	$D_A(a)$	12, 13, <i>modus ponens</i>
(15)	$N_A(a) \rightarrow D_A(a)$	6-14, conditional proof
(16)	$\forall x[N_A(x) \rightarrow D_A(x)]$	15, universal generalization
(17)	F	conditional proof assumption
(18)	$\forall x[M_A(x) \rightarrow \neg D_A(x)]$	4, 17, <i>modus ponens</i>
(19)	$N_A(a) \rightarrow D_A(a)$	16, universal instantiation
(20)	$\neg D_A(a) \rightarrow \neg N_A(a)$	19, transposition
(21)	$M_A(a) \rightarrow \neg D_A(a)$	18, universal instantiation
(22)	$M_A(a) \rightarrow \neg N_A(a)$	20, 21, hypothetical syllogism
(23)	$\forall x[M_A(x) \rightarrow \neg N_A(x)]$	22, universal generalization
(24)	$F \rightarrow \forall x[M_A(x) \rightarrow \neg N_A(x)]$	17-23, conditional proof

The above is a bit abstract so to make it easier to understand I will use a concrete example. Suppose the placeholder for $A(x)$ refers to x being a fact, and to make things a bit less clunky, I will use “ x can be stated entirely in the language of Y ” to mean “what x is can be described entirely in the language of Y .” At the cost of oversimplifying somewhat, the argument would then be this:

- (1) All natural facts are facts that can be stated entirely in the language of psychology and the natural sciences.
- (2) What can be stated entirely in the language of psychology and the natural sciences can be stated entirely in descriptive language.
- (3) Any fact that can be stated entirely in descriptive language is a descriptive fact.
- (4) If folk moral semantics is used for deontic moral facts, then all deontic moral facts are not descriptive facts.

Therefore: If folk moral semantics is used for deontic moral facts, then all deontic moral facts are not natural facts.

The truth of premises (1), (3), and (4) is a closed question given the stipulative definitions the argument uses. Premises (1) and (3) are proven theorems (theorems T_N and T_D , respectively) but these premises can also be justified more informally. A “natural fact” is stipulatively defined as a fact that can be stated entirely in the language of psychology and the natural sciences, and thus (1) is a closed question. A “descriptive fact” is stipulatively defined as a fact that can be stated entirely in descriptive language, and thus (3) is a closed question. For (4), this premise says that folk moral semantics implies that all deontic moral facts are not descriptive facts. That this is true is a closed question, since folk moral semantics definitionally requires that moral oughts are not descriptive oughts.

Premise (2) is somewhat less obvious. Yet insofar as the natural sciences study only the physical characteristics of the physical world, the idea that such language of physics, chemistry, etc. is descriptive (or can at least be restated in descriptive language) seems nearly a truism, largely because it seems clear that such language can be at least restated in non-normative terms (recall that all non-normative terminology is descriptive language).⁶ That leaves the language of psychology, which as mentioned earlier is such that psychological facts are descriptive facts of behavior, the mind, and the mind’s functions; and so *qua* descriptive facts, the language of psychology can be stated entirely in descriptive language. Thus, what can be stated entirely in the language of psychology and the natural sciences can be stated entirely in descriptive language, and premise (2) is true.

The upshot of the Folk Moral Semantics Argument is that if one adopts a moral semantics such that it is a closed question that moral oughts do not have only descriptive characteristics, then deontic morality is non-natural.

⁶ Another way to look at it: if we had physics, chemistry, etc. in their completed forms, the language of physics, chemistry, etc. would still be descriptive (at minimum, it would be restatable in descriptive language).

4. An Argument for Moral Naturalism Implying
Moral Descriptivism

My argument that moral naturalism implies moral descriptivism uses mostly the same premises and much of the same reasoning as the Folk Moral Semantics Argument against moral naturalism (or alternatively, the Folk Moral Semantics Argument for moral non-naturalism⁷).

Let *N* symbolize *moral naturalism is true* and *D* symbolize *moral descriptivism is true*. Thus, if the placeholder for *A(x)* referred to *x* being a fact, premise (4*) below would mean *if all natural facts are descriptive facts, then moral naturalism implies moral descriptivism*. Not only does this argument use mostly the same premises but also mostly the same line derivations for showing that moral naturalism implies moral descriptivism (note that lines (1)-(3) and (5)-(16) are identical to those of the Folk Moral Semantics Argument).

(1)	$\forall x[N_A(x) \rightarrow (N_L(x) \wedge A(x))]$	
(2)	$\forall x[N_L(x) \rightarrow D_L(x)]$	
(3)	$\forall x[(D_L(x) \wedge A(x)) \rightarrow D_A(x)]$	
(4*)	$\forall x[N_A(x) \rightarrow D_A(x)] \rightarrow (N \rightarrow D)$	
(5)	$N_A(a) \rightarrow (N_L(a) \wedge A(a))$	1, universal instantiation
(6)	$N_A(a)$	conditional proof assumption
(7)	$N_L(a) \wedge A(a)$	5, 6, <i>modus ponens</i>
(8)	$N_L(a)$	7, conjunction elimination
(9)	$N_L(a) \rightarrow D_L(a)$	2, universal instantiation
(10)	$D_L(a)$	8, 9, <i>modus ponens</i>
(11)	$A(a)$	7, conjunction elimination
(12)	$D_L(a) \wedge A(a)$	10, 11, conjunction introduction
(13)	$(D_L(a) \wedge A(a)) \rightarrow D_A(a)$	3, universal instantiation
(14)	$D_A(a)$	12, 13, <i>modus ponens</i>
(15)	$N_A(a) \rightarrow D_A(a)$	6-14, conditional proof
(16)	$\forall x[N_A(x) \rightarrow D_A(x)]$	15, universal generalization
(17*)	$N \rightarrow D$	4*, 16, <i>modus ponens</i>

⁷ Though this being an argument for moral non-naturalism might require the background assumption that moral facts exist.

The justification and meaning of premises (1)-(3) is the same as it is for the Folk Moral Semantics Argument (recall that (1) and (3) are proven theorems). Premise (4*) is almost self-evident, but we can adduce it with a simple example: if all moral facts are natural facts, and all natural facts are descriptive facts, then it follows that all moral facts are descriptive facts.

Note that in contrast somewhat to one-term naturalism, line (16) suggests that anything that is natural is also descriptive, and in the more specific case of $A(x)$ meaning *x is a fact*, line (16) suggests that being a descriptive fact is a necessary condition for being a natural fact.

5. Objections

It is one thing to make stipulative definitions. It is another thing to carry them over into definitions the ethical naturalist is willing to accept. As alluded to earlier, the idea of defining what is natural in terms of what is expressible in terminology is not new. Pekka Väyrynen (2021, 513) describes this objection against it:

[I]t seems possible for natural properties to exceed even our best representational resources, non-normative or otherwise. Any natural language can have only countably many predicates, but natural properties might not be only countably many. Some natural properties might also be more fine-grained than what natural languages or human thought can represent. Examples might include the most maximally determinate values along certain continuous physical parameters.

Recall however that in this case the conception of natural facts and natural properties vis-à-vis $N_L(x)$ is about the *type* of language and *types* of things that e.g., physics studies (physics deals with the constituents of the physical world – like space, time, and matter – and the physical interactions of these constituents) and the conceptual domain of what physics studies remains what it is even if our current human terminology does not cover literally every fact of physics. To use an analogy, the set of real numbers is uncountably infinite and an irrational number cannot practically be written out in terms of what comes after the decimal point because the sequence of

numerals would be infinitely long, yet those individual numerals after the decimal point fall under the province of what we can represent and real numbers are still conceptually numbers. We could apply the same principle for natural facts and properties, in which “what it is can be described entirely in the language of psychology and the natural sciences” for $N_L(x)$ is akin to the fact that all real numbers “can be described entirely in terms of a decimal point and the numerals 0 through 9,” not in a practical sense but in a kind of theoretical or conceptual sense. For example, suppose facts of physics were equinumerous with (and as uncountably infinite as) the set of real numbers. If we *per impossibile* used the entire set of real numbers as letters for our scientific vocabulary such that we stated each of the uncountably infinite facts of physics using this language,⁸ this superhuman form of physics language would not change the *types* of things being referred to when it is said that facts of physics are those stated in the language of physics (regarding space, time, matter, and so forth), even if we rely on finite human language to give us a more concrete idea of what those types of facts, observations, etc. are like. The same sort of thing goes for the relevant descriptive facts, properties, etc.⁹ Even if they cannot all be stated in a practical sense, they can be stated in a theoretical or conceptual sense even if finite human language gives us a more concrete idea of what those sorts of things are like.

Apart from representational concerns, one could more directly attack the semantics for what counts as natural. An ethical naturalist could deny that moral terminology is co-referential with a subset of the language of psychology and the natural sciences on the grounds that the defined conceptual domain of $N_L(x)$ is not a necessary condition for something to be

⁸ To use a more concrete hypothetical case for our real-number-based alphabet, if all facts of physics were broken down into a dozen fundamental components (aspects of space, matter, time, etc.), we could use words of twelve letters long (one for each component) to map onto all facts of physics using the first letter for spatial aspects, the second letter for matter aspects, etc. Or given our definition of physics, we could use one letter for the constituents of the physical world and a second letter for the interactions of these constituents.

⁹ Note that if natural facts and the relevant descriptive facts each had the cardinality of real numbers, a vocabulary that used the entire set of real numbers as its letters could map onto both sets of facts. With this in mind, see also n. 6.

natural in the ordinary sense of the term, whereby the ordinary sense of “natural” means something like “of or a part of the natural world.” Some form of this anti-co-referential view is perhaps understandable (see above on the limitations of finite human language), but in this case however, due to the “what it is can be stated entirely in the language of psychology and the natural sciences” being somewhat more conceptual than completely literal¹⁰ as described earlier, the issue would largely be more about what is reducible to that which is within the combined subject matters of psychology and the natural sciences. Consequently, it is difficult to see what a natural fact or property could be in the ordinary sense of “natural” that does not fall under that defined conceptually natural domain if this sense of “natural” means “of or a part of the natural world” (considering that e.g., the natural world is precisely what the natural sciences aim to study). By my lights, any brand of ethical naturalism in which the moral ought does not fall under that defined conceptually natural domain is simply ethical non-naturalism under a different name.

6. Conclusion

With certain tweaking of what a descriptive fact is and what a natural fact is (e.g., being somewhat more conceptual rather than being completely literal¹¹ vis-à-vis “what it is can be described entirely in the language of psychology and the natural sciences”), there is a good case for the moral naturalist to be a moral descriptivist. Similarly, there is a good case for the moral realist who adopts folk moral semantics to embrace moral non-naturalism. Whether morality is natural depends greatly on what moral semantics we are using. To illustrate what I mean by this, consider that whether a “blarg” is natural depends greatly on what we mean by “blarg.” If “blarg” is synonymous with “supernatural deity” then a blarg is non-natural. However, if “blarg” is synonymous with “carbon atom,” then a blarg is natural. Similarly, whether deontic morality is non-natural depends on what we mean by “deontic morality.” On folk moral semantics where the moral

¹⁰ Barring superhuman language.

¹¹ See n. 10.

ought does not have only descriptive characteristics, deontic morality is non-natural. On the other hand, there are no physical laws I am aware of preventing the moral naturalist from using a different moral semantics in which deontic morality is perfectly natural, but in that case when the moral naturalist converses with the moral non-naturalist (or the folk) the people involved may wish to be cautious about talking past each other. Moral semantics regarding the Humean is/ought dichotomy is frequently overlooked in discussions about the existence and ontology of morality. Perhaps that should change to some degree.

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Is it Time Travel?

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Received: 25 April 2025 / Revised: 9 January 2026 / Accepted: 13 January 2026

Abstract: According to David Lewis, time travel occurs when a traveller’s ‘personal time’ has a discrepancy with what we might call ‘external time’ (Lewis 1976, 145). For example, one of two clocks located within a time machine could signal a short trip, while the other may diverge even without limit. In the science fiction classic, *Back to the Future*, Dr. Brown tries to convince Marty McFly that he sent Einstein, Dr. Brown’s dog, on a time travel mission. To do this, he uses previously synchronised clocks (one internal to the time machine and the other external), noting the discrepancy in how they recorded the duration of the trip. The Lewisian characterisation of time travel has many virtues, but it is not without issues and queries. This paper will propose original cases to reflect on the Lewisian definition. As will be shown, the aim is not just to question this definition by introducing problematic cases but rather to clarify and reformulate it: 1) the time traveller’s personal time (internal time) must be greater than zero, despite Lewis’s explicit acceptance of zero-duration journeys, which he characterizes as ‘broken streaks’ (Lewis 1976, 145, 147); and 2) there are unique cases in which no criteria, especially based on Lewis’s definition, seem sufficient to conclude with certainty

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whether a time travel event has taken place. The fictitious cases to be discussed are all intended to support the above conclusions, providing us with an opportunity to appreciate the little-mentioned aspects of the Lewisian definition and its implications.

Keywords: Time travel; temporal experience; temporal dimension; internal time; external time.

Introduction

In his 1976 classic, ‘The Paradoxes of Time Travel’, does Lewis provide a definition of what time travel is? Or does he merely present us with a simple characterisation of the concept? In this article, I will assume that Lewis intended the former.¹ The difference between ‘definition’ and ‘characterization’ concerns the fact that we do not need to propose necessary and sufficient conditions to properly characterise a thesis or concept. However, to define something, we are supposed to do this. It also seems true that a definition could count as a characterisation of a concept or thesis, but not vice versa (i.e. a characterisation may not be a definition). It is important to note that what follows will not be particularly relevant if the reader, contrary to what we assume here, considers that Lewis is actually characterising time travel, because the cases to be addressed will remain problematic anyway. My goal is to suggest possible revisions to Lewis’s definition without changing the core of his explanation – the discrepancy between times as the most important factor. However, while David Lewis’s definition of time travel is internally coherent as a purely metaphysical account grounded in logical possibility, this paper argues that the definition becomes problematic once we attempt to reconcile it with physically informed intuitions about temporal passage, causation, and persistence. Rather than merely clarifying Lewis’s proposal, I offer a revision that departs from its original metaphysical neutrality by introducing constraints motivated by physical considerations, achieving cases that are limits to Lewis’s

¹ For further definitions of time travel, see, for example, Arntzenius (2006, 602); Smeenk and Wüthrich (2011, 5, 26).

definition, and showing that Lewis's account is compatible with 'false negatives'.

One of the main theses is that Lewis's definition finds its 'false negatives' by introducing a difference between times that is equal to zero from internal or personal time. Because of this, the personal time should never be zero after a time travel episode. If we do not accept a restriction based on this aspect, changing Lewis's perspective in this way, some strange scenarios would become possible (i.e. cases in which there is little clarity about the application of the concept 'time travel', such that we would not unequivocally know that something is a time journey).

1. Classical Issues and the Lewisian Definition

One objection to be removed involves a contradiction or inconsistency in the concept of time travel itself. Time travel would imply accommodating inconsistent or contradictory times, which would be impossible (cf. Smith 2024). Therefore, the scenario thus conceived should be considered a logical or conceptual impossibility, according to what some people call the 'Time Discrepancy Paradox' (cf. Holt 1981; Effingham 2020, 42). Examples of inconsistent scenarios are as follows: 'travelers who travel fifty years in just one'; 'a traveler who attains the age of 21 after 50 years of his birth', etc. If this objection were correct, the concept of time travel, as we know it, would have to be rethought.

However, Smith argues that something must be wrong with this objection, since scenarios such as these are physically possible² and known. Although on a much smaller scale than advanced fictional examples, such results, predicted by relativity, have already been realised (cf. Hafele and Keating 1972).³ Time travel along the lines above seems physically possible—someone travelling 50 years (externally) in just one year in their own time (internally). As is known, something can only be physically possible if it is

² That is in accordance with what the laws of nature establish.

³ For a different opinion, which refuses to give time dilation a relevant role in this debate, see Holt (1981). The author states that this kind of inconsistency, which he assumes occurs, is a reason to not believe that time travel is even possible.

also logically possible.⁴ For this reason, we must either review the nomological possibility of such a trip or find the problem in the reasoning that accuses it of inconsistency. Smith (2024) shows that events such as these have already been registered on a smaller scale. Therefore, they must be not only physically possible but also logically possible (i.e. without any contradiction or inconsistency). However, since our point is conceptual, we must go one step further and elucidate the problem with the objection. After all, why does the alleged inconsistency not exist?

One option to delegitimise the inconsistency is to reject it as a ‘question beginning’. That is, the accusation of inconsistency presupposes something fundamental, without which the inconsistency does not occur, and what it presupposes is exactly what this objection is supposed to show. In this case, what is assumed is that time is absolute, and only then do we assign a mismatch in the indication of ‘inconsistent’ time intervals. However, we already know that time is not absolute, or, at least, we have good reasons to believe that it is not. Indeed, in addition to presupposing the inconsistency this objection was supposed to prove, the objector’s reasoning seems to evoke the empirically rejected figure of the absolute time interval.⁵

This difficulty is not new; indeed, much debate of this problem has been sparked in the time travel literature (cf. Christensen 1993; Pitkin 1914, 523; Smart 1963, 239; Williams 1951, 463, 2018, 190–3). The proposed solutions are, however, effective, and, in many cases, include a Lewisian component. If we do not assume beforehand that the time intervals must be absolute, it becomes easy to use the Lewisian apparatus to overcome this problem. In this case, when we say that someone has travelled fifty years in just one year, we should consider that fifty years refers to time measured externally, while one year refers to internal time perceived by the time traveller, which,

⁴ I know that I am being conservative regarding this aspect. However, traditionally, this is the proper way the relationship between modalities stands.

⁵ According to Tegtmeier, Lewis’s account of persistence requires some absolutism on time (cf. Erwin Tegtmeier 2007). Nonetheless, absolutism does not imply the thesis that time intervals are absolute. For different meanings of ‘absolute’ in the literature on space and time, see Friedman (1983, 65).

in any relativistic scenario, would match the ‘proper time’ of the traveller.⁶ All this considered, the contradiction wanes, and only a *petitio principii* that totally disregards relativistic effects could ever argue otherwise (cf. Lewis 1976, 145–8; Grey 1999, 62–3; Harrison 1971, 9–10; Horwich 1987, 114; Le Poidevin 2005, 339–41; MacBeath 1982, 403–6; Nahin 1999, 256–9; Williams 2018, 208–9). Therefore, I conclude in favour of the possibility of having contrasting times, as in Lewis’s definition, which is shown to be logically consistent and empirically adequate.⁷

If correct in their response to this paradox, what the above authors show us is that the Lewisian definition is equipped with the conceptual apparatus necessary to deal with such difficulties. According to Effingham (2020, 42), similar attempts to reject the possibility of time travel have few proponents today. However, the paradox above helps us introduce and discuss the Lewisian distinction properly, since the solution to this problem consists of avoiding a contradiction by indicating different time intervals in different contexts – one external and one internal (Gilmore 2016; Sorensen 2005). Before moving on, it will therefore be useful to take a closer look at the Lewisian definition, especially the author’s characterisation of ‘personal time’.

How can we understand and characterise the fundamentality of the Lewisian distinction between times, especially in the context of the debate about its consistency? To understand the difference between times requires more than instants of time on synchronised clocks, but also facts in the world to be compared. ‘Time itself’ is objective time (Lewis 1976, 160), and personal time is defined as ‘that which occupies a certain role in the pattern of events that comprise the time traveller’s life’ (Lewis 1976, 146). For this reason, properly characterising the Lewisian difference requires more than pointing

⁶ In physics, ‘proper time’ refers to the time duration measured by a clock moving with the traveller.

⁷ Far be it for me to sound like there are no questions about the logical possibility of time travel. There are many such questions, as the kinds of paradoxes (including the grandfather paradox, the self-visitation paradox, and the bootstrap paradox, etc.) involving the notion of time travel, especially into the past (cf. Asimov 2010; Hawking 1992, 604). For the opinion that time travel to the past is metaphysically impossible, see Markosian (2020). For answers to some famous paradoxes, see Effingham (2020).

out discrepancies in clocks that have been previously synchronised. In an interesting article from Sara Bernstein (2022), a broader characterisation of the concept of ‘personal time’ contributes to finding a difference between times, even when there is no discrepancy that could be pointed out in synchronised clocks. Bernstein considers the case of Tamika, a time traveller who travels for just one hour on a time machine. Tamika returns to the past, but precisely to the time one hour before the start of her journey. In this case, according to the author, although there is no quantitative difference between ‘times’, there will be a difference in the direction of the processes that appear in the comparison between two timelines (i.e. one internal and one external), and this difference makes up a scenario consistent with the Lewisian definition. This seems to suggest that the difference in the interval between times, especially in journeys to the past, usually involves causally directed processes in a sequence of phenomena (i.e. the direction of biological events in which the time traveller takes part is different from the direction of the same events *tout court*, when considered in external time). In a journey into the future, the difference is usually signalled between speeds of processes when comparing two timelines. However, it is not difficult to find even more challenging scenarios in the literature, such as the following:

Reverse Aging: 21-year-old DeShawn presses the button on his time machine, and takes twenty years in personal time to travel back twenty years in external time. However, the time machine ages him backwards at a rate of one year per year, such that his body and bodily processes match those of a one-year-old baby upon his arrival in the past (Bernstein 2022, 249).

In the above scenario, there does not seem to be a difference in the speed at which processes occur, nor does there seem to be a difference in the direction of biological events in which the traveller takes part. So how can we characterise a discrepancy between times from a Lewisian perspective? Of course, if it is not possible to find such a difference, then it will also not be possible to say, on the basis of the Lewisian definition, that a time travel has taken place; otherwise, we would have a counterexample to the definition in question.

In the following pages, I will introduce new dilemmas regarding the Lewisian definition. The aim is to accommodate some difficult cases through the inclusion of novel restriction clauses. We will see that in order to maintain the divergence between times, considering the above sense in which ‘personal or internal time’ is characterised, it will be important that personal time has an interval of greater than zero.

2. New Cases to the Lewisian Definition

In this section, I propose new challenges to examine the pertinence of the Lewisian definition. These challenges are inspired by cases in which there is little clarity about the application of the concept of time travel, such that we would unequivocally know if something counts as it.

2.1 *The Present-to-Present Journey*

The first case is as follows: (a) inside a time travel machine, there is an onboard computer indicating the occurrence of a time journey. After initiating the ‘boarding procedure’, the traveller, out of curiosity, attempted to set the exact moment of departure as the destination (perhaps equipped with a trip-scheduling system) to then receive an indication, on the onboard monitor, that a trip was successfully undertaken. In other words, the temporal traveller chooses the instant of departure as his temporal destination, or at least that is what he intended to do, as far as he can see it.⁸ The computer recorded the occurrence of the trip; thus, the traveler has no reason to think that he did not take it. Nonetheless, when the traveller compares their clock with other synchronised devices, there is no indication of a discrepancy between the times, inside and outside the time machine.

⁸ It could be said that if both events – the arrival and the departure – occurred at the same point in space-time, then we would have the same event, not two separate events. This conclusion could somehow discredit the fictitious case presented. However, it is not obvious that two events are always the same, as long as they occupy the same point in space-time. In any case, I do not think that in such a journey, as in (a), the destination has to be the same spatio-temporal point of origin, but just the same point in time, establishing a possible difference.

Moreover, as we know, there are no differences in the order, direction, and speed of processes that can be relevant to indicating the existence of a difference between times, as in any possible Lewisian case. However, in the above scenario, there does not seem to be any such difference, recognisable by any means. It is then that the traveller considers that ‘naturally, if the trip had been made for the exact moment of departure, everything else going on as usual, there would be no difference between the synchronised clocks, after the end of the trip’. Should this indicate that a time travel had elapsed, without, however, the Lewisian condition that always characterise it?

The key issue in the Lewisian definition is related to the ‘proper time’ in the frame of the traveller, when we compare it with ‘time’ as it normally passes.⁹ In the literature, examples of this are part of the known and imagined cases of the so-called ‘twin paradox’¹⁰, and, in each of them, there is effectively a discrepancy between times, signalled by a discrepancy in the clocks (bodies, process, and changes in systems, etc.) that perform their measurement. Therefore, even in the imagined scenario, such a difference would have to occur in order to meet the Lewisian condition (i.e. the divergence between times would have to be accompanied by noticeable differences between previously synchronised clocks or something that relates process to use as a parameter, when they are accurate enough to record the occurrence of that trip).

⁹ Thus, the non-discrepancy between times, when verified on clocks (or some other process that shows us a divergence between time), must mirror an equivalence in ‘times’, just as a difference between times also includes the possibility of its verification.

¹⁰ The ‘twin paradox’ refers to a thought experiment in special relativity involving twins, one of whom makes a journey into space in a high-speed rocket and returns home to find that the twin who remained on Earth has aged more. That is a result implied by the theory, not paradoxical at all. However, it appears to be paradoxical just because each twin sees the other as moving, and so, as a consequence of an application of time dilation and the principle of relativity, each should paradoxically find the other to have aged less. However, the paradox is just a consequence of a naive application of the principle of relativity, among other physical principles.

2.2 Equal Time Slots for Time Travel

A second counterexample could be as follows: (b) imagine that the traveller has a time travel machine at his disposal, which to be successful in such a trip, needs to reach a certain ‘warp speed’ (i.e. a speed such that, when reached, hurls the traveller to a temporal destination).¹¹ Suppose the minimum time to reach such a speed is, say, 3600 seconds, always accelerating. Now, imagine a traveller who wants to travel just one hour into the future, starting and accelerating to complete the journey (ignore the complication that no one would want to make such an unnecessary trip). In this case, the relevant factor could be that the time elapsed during acceleration and upon arrival coincide in previously synchronised clocks, since 1 hour corresponds to 3600 seconds. If the times coincide, there will be no discrepancy between times that Lewis’s definition requires. We can then ask: Was there a time travel? Or again: Was there any time travel, according to what Lewis tells us? If the answer to the former is ‘yes’ and to the latter is ‘no’, we may have a problem to deal with.

The conscientious reader will notice some problems with the proposed scenarios. Therefore, let us look carefully at two possible objections to the considerations mentioned above.

Relativity: The scenario in (b) contradicts basic relativity principles, as personal time in this case is necessarily shorter than external time.

No travel at all: The Lewisian definition correctly predicts that no time travel has occurred and, because of that, there is no challenge.

What can we say about the above objections? First, this traveller’s case is supposed to be a purely conceptual problem and therefore independent – as is usually the case in such matters – of the accessory details that make up the fictional scenario in a thought experiment. However, our objector makes an important point: any possible scenario should not contradict relativity. Fortunately, this problem is solvable. Imagine that the time machine at the traveller’s disposal has to warm up for, say, 3600 seconds before being launched to its temporal destination. In this case, *mutatis mutandis*

¹¹ In science fiction, it is common for a ‘warp speed’ to allow, in a short time, the connection between two remote points in space. In our fictional example, a ‘warp drive’ can quickly connect remote points in time.

for the details of the previous example, the same dilemma arises: Is there a time journey or not, given that the triggered destination corresponds to 3600 seconds? My final answer will be in the affirmative; but first, let me comment on the second objection.

This objection suggests that Lewis would correctly predict that, in such cases, no time travel will occur. The issue lies in the fact that even if internal and external time coincided, which is a theoretical possibility, this would not constitute time travel, according to the definition. However, this conclusion seems a little hasty to me. To show this, we can appropriately expand our story. Imagine that the time traveller makes a sequence of journeys, only one of which causes the clocks to coincide. Now, let's say that the traveller starts a journey to the future one hour and ten minutes (i.e. 4200 seconds) after the start of the activated device, and another for fifty minutes (i.e. 3000 seconds), also counted from the activation of the temporal device (from this point on, I will refer to cases such as this as *b**). Only on a third journey is the time device launched one hour into the future, having to warm up for precisely 3600 seconds in order to be immediately thrown into its temporal destination (b). In all three scenarios, the Lewisian thesis envisages at least two journeys through time. In the first, the previously synchronised clocks show that there is a difference of ten minutes or so, counted from the activation of the time device. In the second, the traveller's personal time seems to be ahead of the outside clock, indicating that there is a difference between 'times'. Only in the third does there seem to be an unwanted coincidence between what the clocks indicate, suggesting that there is no temporal journey at all, since there is no difference between times. However, as far as we can imagine, the operation of the time device and the state of our time machine are the same, within a lack of relevant differences that could separate the cases. Why does the same mechanism of constructing fictitious scenarios sometimes result in scenarios of time travel and, in others, in scenarios that do not constitute it?

Normally, we challenge a definition in one of two ways. We may present a case that is not captured by the definition, although we believe it should be. Alternatively, we may present a case that the definition easily accommodates, although we believe it should not. In either case, what must be clarified is the underlying intuition, and simply reiterating that the

definition does not accommodate some cases, as in (a) and (b), does not count as a promising defence of Lewisianism here.¹² Naturally, because Lewis's definition does not cover cases such as (b), the question we want to ask is: Are (a) and (b) cases of time travel?, and not: Are (a) and (b) cases of time travel according to Lewis's definition? The idea would be just to consult our pre-theoretical intuitions about time travel.

With this in mind, I then present a few reasons for considering cases (a) and (b) as possible challenges. One reason to think of them as challenging can be illustrated by a simple analogy. Just as I can travel between any points in space, the same should apply to time. The present is a point from which and to which we can travel, if we can travel through time in the first place. So, I can leave Manhattan, New York City, and, after a whole trip around the world, without stopping, return to the same place. Within time, everything would be similar. In any case, the journey can be or appears to be 'instantaneous', such as in (a) and (b). Just imagine, for example, that this journey is made at an extremely high speed. If we were to complete the journey at an infinite speed, it would be durationless from the traveller's internal perspective.¹³

Finally, we can explore a special scenario from a Gödelian world. This scenario is an example of what is stated above. In 1949, Gödel famously proposed a solution to the field equations of general relativity, with closed curves connecting the future and the past. In his proposal, someone travelling indefinitely into the future would, from a certain point, return to the past and could even reach the point of origin if the travel continued (cf. Gödel 1949). The question of whether or not, in such worlds, we can move

¹² In any case, when challenging Lewis's definition, we cannot simply assume this author's thesis. That is, anyone who presents a difficult case to consider, taking the Lewisian definition as a backdrop, is certainly not asking whether the alleged counterexamples represent Lewis's definition (doing so would be nonsensical). The question should be 'whether the cases presented are examples of time travel despite what the Lewisian definition tells us'.

¹³ Fortunately, such a condition is unrealistic and violates what we think we know about the laws of nature (i.e. that there is a physically possible speed limit, namely the speed of light). But the problem here is the character of zero duration of the trip and not the fact that it is a trip from point t to the same point, as it is in the examples I am proposing.

forward until reaching the point of origin, thus making this journey ‘instantaneous’, is simply a matter of speed, except in the case of instantaneous teleportation, which is another possibility. If the speed attained by the traveller was infinite, no matter how great the distance would be, the possibility of there being an interval equal to zero would be settled. Naturally, this is not a scenario we should endorse; however, the reasons for this have nothing to do with the impossibility, *prima facie*, of establishing travel from present to present. What is important here is to show that although some journeys apparently do not establish a divergence between times, we perhaps want to avoid suggesting they are not – consulting only pre-theoretical intuitions – cases of time travel. After all, if on a journey to the far future you return to the past and reach the point of origin, this event could be described as a journey from the present to the present.¹⁴ Clearly, this scenario is perfectly Lewisian, thus offering a clue of how journeys such as this should appear. Consequently, someone unfamiliar with the Lewisian definition could well identify cases such as (a) and (b) as examples of time travel, using only pre-theoretical intuition.

I think we should look for a Lewisian scenario in the proposed challenge. Not considering it as a challenge will seem *ad hoc*, everything else remaining the same. This seems to be just an expedient way to avoid the main issue, namely, how to find a Lewisian discrepancy within the apparent coincidence between times in the example discussed.¹⁵

¹⁴ It could be objected that there are alternative ways of describing the scenario in question. For example, we could hypothesise that the case involves not one journey, but two: one outward and one return, from the present to some point and so again to the present. Although this is true, it does not pose a problem at all. The way of describing events such as this takes on a certain conventional aspect, and maybe there is no more correct way of doing this, strictly speaking. Note that the same applies to spatial journeys (i.e. my journey between Barcelona and Madrid can also be described as many ten-kilometre journeys between different parts of Spain, and so on).

¹⁵ It is important to stress that these cases do not show that Lewis’s definition is internally inconsistent. On the contrary, they arise precisely because Lewis consistently allows for zero-duration journeys and discontinuous personal histories. The problem is rather that, once such cases are admitted, the criterion of temporal discrepancy may fail to classify certain scenarios as time travel, even when the operation

2.3 *A Confused Traveller between Worlds*

One last challenge will be considered: (c) suppose a mountaineer enters a cave in the Himalayas. He could never have imagined that in this place, unknown and abandoned, resides a ‘dimensional portal’. By going through this portal, the mountaineer enters a different and peculiar world. In this world, the past appears identical to the mountaineer’s homeworld past. It would seem that our character had been transported to a possible world with the same past, or, better said, a past *prima facie* indistinguishable from the past in his world of origin. Seeing himself in this unusual situation, he peremptorily concluded that ‘that cave holds a time tunnel from where I was transported to the past’.¹⁶ Suppose now that our mountaineer is an amateur philosopher, familiar with Lewis’s definition, which he uses to arrive at the conclusion: ‘Effectively, my passage through the fog of the cave took only five minutes, as shown by my watch. Despite this, what appears outside the cave is very different. It is as if outer time has gone back many years, and everything is now exactly as it was, except maybe for my presence.’¹⁷ I am perhaps, so to speak, the first time traveller into the past!

We know from the description of the story that the traveller is mistaken. He effectively did not travel to the past, having only travelled between different dimensions, in the manner of modal dimensionalism (cf. Yagisawa 2010). Of course, Lewis would certainly not consider a case such as this. According to the author, possible worlds are isolated in space and time, making it impossible for there to be transworld entities (cf. Lewis 1986, 69). Question (c) therefore presupposes a break with aspects of Lewis’s theory,

of a time-travel mechanism is stipulated. This suggests not a flaw in Lewis’s metaphysics, but a limitation in the definition’s ability to accommodate physically motivated intuitions about temporal passage.

¹⁶ Effingham (2020) calls such events ‘warped time travel’ (i.e. the idea is that a special place, rather than a machine, is responsible for one’s travelling in time).

¹⁷ The idea that in a return to the past events would repeat themselves, identically to their first occurrence, is not innocent. It brings with it immense theoretical baggage and seems to be committed to some form of determinism or ‘necessity of the past’. However, this approach seems to be the most common way of thinking about a return to the past scenarios.

modal realism. Fortunately, for our purposes, nothing indicates the impossibility of approaches compatible with the imagined scenario (e.g. Everettian multiverses (Everett 1957)¹⁸, modal dimensionalism (cf. Yagisawa 2010), etc. Even if we do not abandon Lewis's modal realism, a conceptual problem remains: in certain scenarios, it is impossible to determine with certainty whether time travel has occurred. For example, a supposed time traveller could still be present at a hyper-realistic simulation of the past, or take part in a world with duplicates of future temporal parts of objects, people, and events, etc. It would not be difficult to make these scenarios compatible with the mountaineer's deception by imagining possible misdiagnoses, motivated by a Lewisian technique or method of ascertaining time travel (i.e. based on detecting a supposed discrepancy between times, which perhaps does not exist).

Now we can see why this hypothetical scenario poses difficulties. The point to clarify concerns not the Lewisian definition itself but the possible method by which we can tell if time travel has taken place. This method consists of comparing previously synchronised clocks (or some process that can work as clocks) before and after the journey. In some cases, a comparison will be necessary using other strategies, such as the many sequences of ordered events. The traveler may come to the realization that he has traveled to the future when he observes that the individuals he knows have aged significantly over the course of five minutes. Alternatively, he may observe that the sequence of events he is currently witnessing is identical to 'another one' that he has already experienced, in a meticulously maintained order that is consistent with the one he witnessed in the past (or records, perhaps from the distant past). As the method in question consists of comparing 'times' in some way, whether by means of clocks or calendars of sequential events, we can call it 'Lewisian'. However, is this method reliable? Are there any methods that are so?¹⁹

¹⁸ In the proposal known as quantum modal realism (cf. Wilson 2020), Everettian multiverses are like Lewisian worlds, spatio-temporally separable from each other. But is this necessarily the case?

¹⁹ Some people might think that this counts as both (i.e. travel between worlds and travel between times). I do not believe so. I want to say that travel between worlds

3. Answers to the Above

I am convinced that the cases presented can assist us to see that the Lewisian definition is insufficient for certain physically motivated cases. More specifically, I think that the solution to the above entails accommodating some criteria collectively. The following are not presented as an interpretation of Lewis's original account but as conditions for a revised definition capable of accommodating the negative cases, even considering that we are keeping the Lewisian core – the discrepancy between times – as the most important thing:

1. A trajectory through the time dimension (fourth dimension) of the same world, or temporal line, the spatial dimension being irrelevant.
2. A discrepancy between 'times', in Lewis's terms.
3. The proper (personal or internal) time interval, from the perspective of the traveller, should not be equal to zero but greater.
4. There must be a causal relationship between the journey and the discrepancy between 'times'.

Let us see how elements 1 through 4 help us meet challenges (a) through (c). We can first take into consideration the challenge of the 'journey from the present to the present'. Here, such a case would only represent difficulty if condition 3 were not respected.²⁰ It would be more correct to separate cases of time travel from cases of 'temporal teleportation'. Temporal teleportation is a case in which the traveller's internal time can coincide with zero between the beginning and end of a temporal journey.²¹ This is because teleportation

seems to be a different kind of journey, since it is not clear that there is a correspondence between times in different worlds. For this reason, there is also no clear discrepancy between times.

²⁰ According to current physical understanding, the proper time interval for any traveller is indeed non-zero, which makes the Lewisian definition generally appropriate when approached in the technical context of the theory of relativity.

²¹ However, the idea of teleportation faces more difficulties than just the one imposed by Lewisian definition. Effingham presents some problems with typical scenarios involving temporal discontinuity. In cases such as these, where will the temporal traveller be? Is he divided between the initial and final moments, when the trip is between different instants? Or is he entirely in both points in time? How can

is a discontinuous journey in space-time (i.e. a journey between two points without any passage through intermediate stages).²² I believe that some cases of temporal teleportation may generate false negatives within the Lewisian definition, since by passing through time without any intermediate steps, criteria 3 could be disrespected, generating the possibility of (a) and (b).²³ To clarify, I do not think that cases of temporal teleportation are impossible or inconsistent. I do believe, however, that we should include, in cases such as these, an interval between times greater than zero to prevent false negatives. So criteria 3 must be true to work as a restrictive factor here.²⁴

We can propose that by not violating criteria 3, what appears to be a trip from the ‘present to the present’ can be interpreted as a trip to another time. When the time device is triggered to a destination equal to the moment of departure, a journey begins, and the time machine moves through the fourth dimension of the universe. Only then does it return to the initial instant. If, when moving through this dimension, you first advance and then retreat, the journey will be toward the future; however, if, when travelling through the fourth dimension, the path is reversed, the trip will then be a trip to the past, and later, a return to the present. Of course, since it is a

we substantiate the random order of instantaneous events (e.g. the arrival and departure of the time traveller)? What would happen if the traveller instantly arrived at a point in space-time occupied by some material, such as a concrete wall? Given that his arrival is immediate, how could he avoid such a circumstance? (cf. Effingham 2020, 11–12; Pitkin 1914, 524–25).

²² Note that (a) and (b) are problematic if they exemplify cases of teleportation, as otherwise, travelling from the present to the present, such that the interval of this journey is equal to zero, would require impossible speeds, as in the example of Gödel’s world above.

²³ A journey that includes intermediate points between the beginning and the end cannot equal zero, unless it takes place at infinite speed.

²⁴ Another reason for not including some teleportation cases is a certain violation of the causal order of events. An ‘instantaneous’ trip violates the way causality normally takes place in time (i.e. the arrival at a temporal destination is caused by a journey that, it seems, should have a beginning separated by a certain duration). Thus, the ‘causal signal’ between events has a finite speed of communication in time and cannot be durationless – note that this last question does not apply to temporal teleportation that does respect criteria 3.

very short trip, everything could happen in milliseconds, without the time traveller even being aware of it. Importantly, in possession of sufficiently accurate clocks to account for small differences between ‘times’, we may know that there was ‘time travel’.²⁵

The reflection on (a), though initially disconcerting, helps shed light on an important condition under which Lewis’s account operates, though one that I do not ultimately endorse. Indeed, Lewis seems to think of his definition as entirely consistent with ‘instantaneous leaps in time’, as when he says, commenting on time travel and the persistence condition of travellers: “*And if he travels either way instantaneously so that there are no intermediate stages between the stage that departs and the stage that arrives and his journey has zero duration, then he is a broken streak*” (Lewis 1976, 147). Or, even more relevant: “*What is time travel? Inevitably, it involves a discrepancy between time and time. Any traveler departs and then arrives at his destination; the time elapsed from departure to arrival (positive, or perhaps zero) is the duration of the journey*” (Lewis 1976, 145). In the passages above, Lewis explicitly allows for instantaneous travel, resulting in what he calls ‘broken streaks’ (i.e. discontinuous sequences of temporal stages). It is not just Lewis who appears to be willing to accept the possibility of journeys whose personal time is equal to zero. In the following extract, D. C. Holt seems to have the same understanding, as can be seen from the italics I have highlighted:

It is generally recognized that time discrepancies are an inherent feature of journeys through time. Whether a time traveler travels into the future or past, *whether or not his journey takes time*, there will emerge inconsistent measurements for the interval of time separating his departure from his arrival. For example, if he travels from the last day of 1981 to the last day of 1982 in fifteen minutes, he will arrive at his destination both fifteen minutes and one year after he departs: *if his journey is instantaneous, his*

²⁵ If I am correct, journeys in which the traveller’s personal time is equal to zero cannot be accepted, especially by the Lewisians. We know this restriction may have the cost of excluding fictitious examples of ‘time travel’. However, should we accommodate all the cases we can imagine, taking any definition as a starting point? I do not think so.

arrival will take place immediately after but also one year after he departs: if he journeys into the past, he will depart before, but also after, he arrives. This is an essential, indeed a definitive, feature of time travel as it is popularly conceived (Holt 1981, 1).

My proposal rejects such cases, not because they are logically incoherent, but because they conflict with a physically informed conception of temporal passage and causation, generating those false negatives in special limit cases.²⁶ Regardless, I contend that cases such as (b) can be solved in the same manner, by using the restriction that changes the Lewisian definition in this important manner. The problem will disappear with the non-lewisian restriction in criteria 3. Thus, after reaching ‘warp speed’ (or when the time machine heats up long enough, in the second version of this thought experiment), the spacecraft, travelling through the fourth dimension, will take a few moments to reach its destination. The Lewisian criteria would be established even if the result was a difference between ‘times’ of just milliseconds, which only a very accurate clock could indicate. Cases (a) and (b) are similar but not redundant. They are indeed complementary because while one could be suspicious of (a) for seeming too anecdotal, involving instructions whose operation is difficult to interpret in a temporal device, or at least very strange, the second cannot be discarded so easily.

One could question the fact that my answer introduces important changes to the cases that were previously presented. Initially, the cases had no time interval; now, after the introduction of the restriction in 3, they have a Lewisian interval between times (even considering that it is very small). However, the change introduced in the answer should not be a problem, as my purpose is to create, with the introduction of these special cases,

²⁶ Lewis explicitly allows for the possibility of zero-duration time travel, in which the traveller’s personal time has zero duration. In such cases, the traveller’s career in personal time does not form a continuous sequence of temporal stages but instead exhibits a discontinuity, which Lewis describes as a “broken streak” (Lewis 1976, 147). Importantly, Lewis’s account is grounded in logical possibility, where causal relations – understood as counterfactual dependence – do not require physical continuity or temporal duration. It could be read as a permissible consequence of Lewis’s four-dimensionalist ontology, according to which personal identity does not require temporal continuity or intervening experiential stages.

an occasion to discuss an issue that has not yet been explored in the Lewisian definition, which is that the traveller's personal time must never be equal to zero.

Fortunately, accepting 3 is all we need to understand those cases as Lewisians. If we can indeed reinterpret (a) and (b), we might be more successful in defending Lewis's definition, without any *ad hoc* steps based only on the need to enforce the definition. However, in virtue of what the criteria 3 is so important, after all? Of course, 3 is not intended to be true just because it helps to avoid problematic cases, but for independent reasons. To put it more clearly, it is the basis that makes 3 true that can act as the reason to avoid (a) and (b). But what is this basis? A strong ground for this concerns the idea that cause and effect cannot be instantaneous events. In this case, scenarios such as (a) and (b) violate this principle. For cause and effect to be instantaneous in this way, the signal between events would have to have an excessively high speed, far exceeding the speed of light. However, of course, these scenarios can be ruled out, since they violate what we believe to be true according to relativity.

One might think that the above principle does not constitute evidence for the truth of 3, but rather for the impossibility of events such as (a) and (b). But this way of thinking is, in my opinion, incorrect. Note that we have argued, especially with the introduction of scenarios such as Gödelian worlds, that (a) and (b), or even some cases of temporal teleportation, are not problematic *per se*. The problematic cases disregard 3, which I think is true and can be defended independently, using the above reasoning. If we reject (a) and (b) in this way, we are left without unproblematic scenarios of time travel which, in the meantime, seem perfectly legitimate and Lewisian (e.g. travelling from point t to the point t , as in a Gödelian world).

It remains to be seen whether we will have the same luck with (c). The problem lies in the fact that our character uses a possible method, inspired by the Lewisian definition, which results in a misdiagnosis of the situation. The point of it is not that Lewis's definition is defective, but that no epistemically infallible method exists for determining whether time travel has occurred, even if a correct metaphysical definition were available. In the case of transworld travel, confusion arises because the mountaineer does not know whether he has made a temporal journey, although he has a criterion

that, taken in isolation, makes him think so. How can Lewis's definition be prevented from being part of that deception? Once in possession of a definition that contemplates 1, our mountaineer will not think of himself as being in a position to know that he has travelled through time. He may realise that he might not know it, or at least he could suspend his judgement of this issue, when well informed by the criteria 1. This will be because the mountaineer knows that a journey through time involves a very specific path, with a necessary route, distinct from space or the transworld. Upon knowing this, he is in the position to know that without a method to discriminate cases such as these, he will not be able to recognise that he has travelled in time. What (c) helps us expose is that the technique of comparing previously synchronised clocks (or any other time counting device) has its limits and is, thus, sometimes insufficient. We can go even further: no known technique seems entirely free of counterexamples. Indeed, there does not seem to be a foolproof method of knowing whether time travel has occurred.²⁷ I think that in this negative diagnosis lies one of the most important contributions of this paper: There is no method that is completely free of mistakes to know if time travel has been undertaken.

Finally, it may be useful to mention criteria 1 to 4 as complementary: The discrepancy between 'times' must be causally related to a crossing, which in turn must include at least one dimension of the universe (time, the so-called fourth dimension), which cannot be confused with any transworld crossing, and which will not consist of events with no elapsed personal time (arrival and departure). Indeed, the very idea that trips or crossings can be durationless seems to me completely questionable.

²⁷ Holt (1981) makes a similar point. According to the author, in many cases typically presented as 'time travel', the conclusion that they really are such journeys is hasty. However, unlike the author, our proposal is purely epistemic – it rejects the existence of a criteria from which we can know that there has been a time travel – which in Holt's view contributes to rejecting the alleged scenarios of 'time travel' as a possibility in the first place.

Conclusion

If a time traveller can travel instantaneously to any temporal destination, there will be cases that the Lewisian definition, as originally formulated, cannot reliably capture.

Travelling like (a) and (b), however, can be Lewisian, as in Gödelian worlds, but criteria 3 must always be respected in any such scenario. We have also seen that the possible Lewisian method for discriminating time travel from other scenarios has gaps, and is, in fact, compatible with deception (i.e. cases in which there appears to be a discrepancy between times, when in fact there is not). Finally, by discussing little-explored issues and proposing useful criteria, such as 3, this article presents and substantiates a negative result: We still have no infallible method for verifying or knowing whether time travel has taken place.

Funding

This research was part of different funded positions, namely, by the Portuguese Foundation for Science and Technology, grant number UIDB/00683/2020 (Catholic University of Portugal, Center for Philosophical and Humanistic Studies, Braga, Portugal), and CNPq Brazil (Post-doc Junior).

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Modal Essentialism, Possible Worlds and the Problem of *De Re* Representation

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Received: 26 February 2025 / Accepted: 23 January 2026

Abstract: Modal essentialism holds that some x is essentially F if and only if at every possible world at which x exists, x is F . This view entails (ignoring the case of extreme essentialism) that distinct possible worlds can represent *de re* (singular) possibilities for the same individual. In the literature we find haecceitist and anti-haecceitist explanations of *de re* representation. The aim of this paper is to analyse which explanations of *de re* representation are consistent with genuine (nontrivial, objective) and plausible variants of modal essentialism. As I demonstrate, only moderate haecceitism meets this criterion. However, its weakness lies in its inability to account for intuitions about the variability of our modal judgments. In contrast, extreme haecceitism and moderate anti-haecceitism (modelled on qualitative counterpart theory) have the advantage of accommodating both essentialist and variability intuitions, provided both views are supplemented with a notion of quasi-essentiality.

Keywords: *de re* modality; essence and essentialism; modal representation; haecceitism; possible worlds; transworld identity.

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1. Introduction

The modal view of essence (Plantinga 1974; Kripke 1980; Forbes 1985) identifies essential properties with necessary properties:

Modal Essentialism: Some x is essentially F if and only if at every possible world at which x exists, x is F .

However, as Fine (1994) and others (Correia 2006; 2012; Oderberg 2007; Koslicki 2012; Hale 2013; Kment 2014) have argued, necessity alone is insufficient for essentiality, as individuals can possess many necessary properties that are not essential to them. In response to this issue, modal essentialists typically introduce additional conditions for properties to qualify as essential, such as sparsity (Cowling 2013; Wildman 2013), intrinsicity (Denby 2014, Bovey 2021), non-triviality (Della Rocca 1996), or non-triviality coupled with qualitateness (De 2020).

The purpose of this article is to explore the relationship between Modal Essentialism (in any of its various forms) and the representational nature of possible worlds, specifically their capacity to represent singular facts about individuals. My analysis begins from the observation that Modal Essentialism implies that distinct worlds can represent the same individual as existing in them. For this to be possible, there must be facts that determine when representations at distinct worlds concern one and the same individual, whether understood in terms of genuine transworld identity or counterpart relations. These facts, rightly understood (as explained below), determine facts about individuals' essential properties.¹ For example, Socrates is essentially human *because*, at every world at which he exists, he is human. Multiple worlds therefore represent Socrates as existing, and all such worlds

¹ As Kripke (1980, 42) has noted, "The question of essential properties is [...] equivalent to the question of 'identity across possible worlds.'" Kripke, however, worked with a narrow conception of transworld identity that is incompatible with counterpart theory and with modal realism without overlap – a controversial stance, since both counterpart theorists and modal realists can be essentialists. As I will show shortly, there is a more general, representational notion of transworld identity which is equivalent to the question of essential properties, and which remains compatible with both counterpart theory and modal realism.

represent him as human.² This shows that facts about essence depend on how worlds manage to represent individuals across worlds.

When addressing the problem of the representational nature of possible worlds, which is usually linked to the issue of transworld identity, the first step is to distinguish between the epistemic problem of transworld identification and the metaphysical problem of transworld identity.

The epistemic problem of transworld identification concerns how we are able to track a particular individual across various possible worlds. As recognized in the literature (Plantinga 1974, Chap. 4; Kripke 1980, Van Inwagen 1985), this is a pseudo-problem. We determine what we refer to in modal contexts simply by stipulation – though it is important to note that stipulation does not grant us epistemic access to what is possible or not. Instead, it merely allows us to specify the subjects of our modal investigations.

In contrast, the metaphysical problem of transworld identity is a genuine issue, which has controversial and uncontroversial variants (see Divers 2002, 258-260; Lewis 1986, 193-194). The controversial view can be interpreted in either an ontological sense, concerning the constituents of worlds, or a semantic sense, concerning the elements of the domains of quantification associated with each world:

Ontological Transworld Identity: There is an entity E and there are two worlds $w1$ and $w2$ such that E constitutes (is part of/is a member of) $w1$ and $w2$.

Semantic Transworld Identity: There is a semantic element e and there are two worlds $w1$ and $w2$, and two domains of quantification $D(w1)$ and $D(w2)$ associated with each of the worlds, such that $D(w1)$ and $D(w2)$ contain e .

Both of these views are controversial, as they are rejected by those who believe that possible worlds and/or their domains of quantification are

² Facts about the transworld identity of individuals would be irrelevant to facts about essence if individuals were assumed to be worldbound. But this would imply that, for any individual x , all of its properties are essential to it. I set aside this extreme form of essentialism, which lacks contemporary proponents, and focus instead on moderate versions of Modal Essentialism.

disjoint and never overlap (e.g., Lewis 1986). However, there is an uncontroversial transworld identity view, which simply asserts that:

Uncontroversial Transworld Identity: There is an entity e and there are worlds $w1$ and $w2$ such that e exists *according to* both $w1$ and $w2$.

This view is consistent both with theories that keep worlds and/or their domains separate as well as with those that allow them to have common parts/members. Uncontroversial Transworld Identity merely requires two assumptions concerning the representational nature of possible worlds:

- (1) Worlds are representational beings; they represent certain facts as obtaining *according to* (in short, *at*) them.

and:

- (2) Distinct worlds are able to represent the same entity as existing according to them.

From this point onward, I will focus on individuals (such as humans, electrons, artifacts) and the facts about them. Modal statements about the modal properties of individuals are referred to as *de re* modalities. Although most scholars agree that worlds are representational in nature, as implied by the two assumptions (1) and (2), they provide the truth conditions for *de re* modalities in different ways: some rely on the counterpart theory, while others rely on the transworld identity theory (in the controversial sense), and associated with it standard Kripkean semantics of modal statements. These two approaches to *de re* modalities are independent of particular views about possible worlds and can thus be applied within both modal realist or actualist (ersatzist) frameworks. Consequently, a world w (whether genuine or ersatz) can represent a fact like *Socrates exists* either by containing his counterpart (genuine or ersatz), Socrates himself or his parts (as in the case of modal realism with overlap), or his abstract representative (as in the case of ersatzism).

However, beyond the challenge of providing truth conditions for *de re* modalities and explaining what makes a world represent an individual as existing at it, there is a deeper issue regarding the very representational nature of worlds. Once we accept that worlds represent singular facts about individuals (for example, facts like *Socrates is human* or *This ball is red*),

a further question arises about how those facts relate to general (qualitative) facts that hold at a world, such as *All humans are mortal* or *Someone is human*.

By *de re representation* of a world w , I mean the complete set of singular facts that are represented as holding at w , whereas by *qualitative representation* of w , I mean the complete set of general facts represented as holding at w . The problem of *de re* representation then becomes:

The Problem of De Re Representation: How is the *de re* representation of some world w related to its qualitative representation?

In the literature, two opposing answers to this question emerge. On the one hand, haecceitism (Adams 1979; Salmon 1996; Elshof 2000; Mackie 2006; Kment 2012, 2014; Stalnaker 2012; Russell 2015) holds that the *de re* representation of a world w is independent of its qualitative representation. On the other hand, anti-haecceitism maintains that the *de re* representation does depend on the qualitative representation.³

It is important to note that the problem of *de re* representation is general in the sense that it is independent of any particular theory of possible worlds or methods for analysing modalities *de re*. This means that both haecceitist and anti-haecceitist accounts of *de re* representation are available to modal realists and actualists alike, and can take either counterpart theoretic or (genuine) transworld identity forms.

The aim of this paper is to explore how various haecceitist and anti-haecceitist accounts of *de re* representation relate to the issue of Modal Essentialism. This issue has not been comprehensively analysed in the literature. One of the few exceptions is John Divers, who writes:

On the neutral [possible world] account, essential properties of an individual are all of those features that it has at every world at which it exists, and an essence of an individual is an essential feature of that individual such that, at any world, anything that has that feature is

³ Those modal variants of haecceitism and anti-haecceitism should be distinguished from their metaphysical counterparts that concern structure of reality or nature of individuation. For more details on this distinction see Fine (2005), Scarpati (2023), Lenart (2023).

identical to that individual. So via the neutral account, facts about representation (i.e. facts about what is the case at a world) and how these are fixed, have an obvious bearing on questions of essential properties and essences. (Divers 2002, 265)

Divers, however, has not provided a systematic analysis of this problem. In this paper, I aim to address this gap. I will distinguish between moderate and extreme variants of haecceitism and anti-haecceitism, arguing that only moderate haecceitism is compatible with genuine and plausible forms of Modal Essentialism. A key reason for this is that the most promising alternative accounts of *de re* representation – extreme haecceitism and moderate anti-haecceitism modeled on qualitative counterpart theory – render *de re* modalities systematically inconstant, which is incoherent with (genuine) Modal Essentialism.

However, as I will show, introducing the notion of quasi-essentiality allows both views to align with essentialist intuitions while at the same time still being able to account for the inconstancy – something moderate haecceitism fails to do. A modal essentialist, however, might find the notion of quasi-essentiality unsatisfactory. In that case, she would be left without a plausible account of *de re* representation, which Modal Essentialism requires.

Consequently, such an essentialist may be compelled to abandon the possible worlds framework altogether and instead either take the modal character of essences as primitive, analyse it in terms of dispositions or potentialities, or define essences in a non-modal, Finean manner. My analysis may thus provide indirect support for these alternative approaches to essence.

The structure of the paper is as follows. Section 2 outlines the desiderata for genuine forms of essentialism. Section 3 provides a brief overview of how haecceitist and anti-haecceitist doctrines will be understood throughout the article. Sections 4, 5, 6, and 7 explore how various anti-haecceitist and haecceitist accounts of *de re* representation interact with the essentialist framework. Section 8 compares most promising views that align with genuine Modal Essentialism with those that oppose it, advancing an argument in favour of the latter. However, a strategy for reconciling those anti-essentialist views with genuine Modal Essentialism is provided. Finally, Section 9 concludes the paper.

2. Desiderata for Genuine Essentialism

In order to proceed, we need to settle what are the desiderata for a genuine variant of Modal Essentialism. From now on, by *Genuine Essentialism*, I will understand a combination of three theses:

Genuine Essentialism: (1) essences are context independent, (2) essences are not trivial and non-minimal, (3) essentialist truths about individuals are factual.

These assumptions appear moderate and are widely shared by proponents of essentialism (both modal and non-modal) who treat it as a substantive metaphysical position. In what follows, I will assume that any essentialist view that fails to meet at least one of these desiderata turns into a *Shallow Essentialism* (strong or weak, depending on how many components of Genuine Essentialism are denied). Therefore, researchers who describe themselves as *true* essentialists should endorse some form of Genuine Essentialism. Relatedly, genuine modal essentialists should endorse *Genuine Modal Essentialism*.

The intuitive support for (1) is that individuals have essential properties or essences (by an essence I mean a collection of all essential properties of an individual) independently from how we think or talk about individuals. (2) is supported by the intuition that essential properties and essences are informative, that is, they discriminate individuals from other individuals, ground their identity and persistence conditions, and facts about exemplification of other properties, which metaphysically follow from essential properties or essences. Finally, (3) is supported by a strong intuitive belief that *individuals* (besides natural kinds or abstract entities) have essential properties or essences.

Final note: genuine essentialist accounts can vary in terms of how many essential properties are attributed to individuals and whether individuals possess individual essences (collections of essential properties that are both necessary and sufficient for the existence of an individual). Generally, variants of essentialism that ascribe fewer essential properties to individuals and avoid commitment to individual essences tend to be more plausible due to their lower ontological and ideological costs (e.g., as discussed below, some variants of individual essences entail certain rather implausible modal theses), as well

as reduced epistemic demands (the more essential properties we attribute to individuals, the more we must say about how they can be discovered).

3. Characterising Haecceitism and Anti-Haecceitism

The second task before proceeding with the actual analyses is to briefly outline how the doctrines of haecceitism and anti-haecceitism will be understood throughout this paper.

Recently, researchers have increasingly identified haecceitism with the view that there exist possibilities which differ non-qualitatively without differing qualitatively (Cowling 2012; De 2022). Anti-haecceitism, on the other hand, holds that no such possibilities exist. For example, consider the possibility that tomorrow the universe undergoes a complete reset, and everything that occurred before tomorrow will replay exactly the same way. Suppose the universe has undergone such resets many times before. Each epoch of the universe resulting from these resets might be treated as a distinct possibility that tells the same qualitative story but differ non-qualitatively in terms of which individuals they involve (this example is adapted from Russell 2015, 389). Other examples of haecceitist possibilities include Kripke's dice (Kripke 1980), individuals swapping their qualitative roles (Chisholm 1967; Lewis 1986, Chap. 4.4), or possibilities involving indiscernible individuals (Adams 1979; Lewis 1986, Chap. 4.4; Stalnaker 2012, Chap. 3).

In my view (though I cannot fully defend it here), if we endorse the theory of possible worlds, these formulations are not fundamental enough. Whether haecceitistic possibilities are permitted depends on one's stance on *de re* representation. I thus take haecceitism and anti-haecceitism to be, first and foremost, answers to The Problem of De Re Representation. In this respect, I follow Lewis (1986, Chap. 4.4). However, the key difference between my approach and Lewis's is that I distinguish between moderate and extreme variants of these views, while Lewis did not (at least not explicitly).

For Lewis (1986, 221 – 22), haecceitism asserts that *de re* representation does not supervene on (i.e., is not necessitated by) qualitative representation, while anti-haecceitism claims that it does. Consequently, if *de re* representation does not supervene on qualitative representation, haecceitistic

possibilities are genuine. If it does, such possibilities do not exist. Nevertheless, Lewis's formulation of anti-haecceitism still allows for the legitimacy of the notion of *de re* representation: it remains meaningful to ask whether Socrates (or his counterpart) exists at a given world. However, whether a world *w* represents Socrates as existing depends on whether *w* represents certain qualitative facts, which are both sufficient and necessary conditions for Socrates' existence (or the existence of his counterpart).

Supervenience, however, is not an explanatory notion but merely a concept of necessary covariance. Thus, (Lewisian) haecceitism simply states that *de re* representation is not always (necessarily) determined by qualitative representation, while (Lewisian) anti-haecceitism asserts that, if *de re* representation is determined, it is always (necessarily) determined by qualitative representation. Anti-haecceitism is however consistent with the possibility that some singular facts may be indeterminate. In my view, these are the characterizations of *Moderate Haecceitism* and *Moderate Anti-Haecceitism*.

There are, however, more extreme variants of these views, which involve a more substantial notion of a dependence relation linking *de re* and qualitative representation of worlds. By *Extreme Haecceitism*, I refer to a view in which *de re* representation is explanatorily independent of (or ungrounded in) qualitative representation. This means that any world can represent any singular facts, independently of the qualitative truths it represents. In contrast, *Extreme Anti-Haecceitism* asserts that the notion of *de re* representation is illegitimate; worlds represent only qualitative facts.

Both views have significant modal consequences: Extreme Haecceitism implies that any individual could be the subject of haecceitistic possibilities and could be represented as having any qualitative character, while Extreme Anti-Haecceitism implies that all possibilities are general in nature; there are no singular possibilities about individuals at all. As a result, all *de re* modalities – statements about singular possibilities and necessities – become non-factual.

Now, let's examine how these four views connect to the issue of Genuine Modal Essentialism. I will start with anti-haecceitism.

4. Moderate Anti-Haecceitism

Moderate Anti-Haecceitism says that *de re* representation is necessitated by qualitative representation: every change in *de re* representation of some world *w* has to be accompanied by a change in its qualitative representation. Such a view can take either a form of *Qualitative Counterpart Theory*, or *Qualitative Genuine Transworld Identity Theory*. Let's consider them in that order and identify how they relate to Genuine Modal Essentialism.

4.1. Qualitative Counterpart Theory

According to the counterpart-theoretic variant of anti-haecceitism, a world *w* (genuine or ersatz) represents that some individual *x* exists at it, if *w* contains its qualitative counterpart (genuine or ersatz).⁴ In effect, the counterpart theorist can provide purely qualitative truth conditions for modalities *de re*, including essentialist truths: "Some *x* is essentially *F*" is true if and only if all counterparts of *x* are *F*. However, due to the fact that what is similar to what is context sensitive, what is essential to what will vary from context to context as well. A certain context may seem more natural to us than another, but this does not indicate its metaphysical privilege. In consequence, Qualitative Counterpart Theory is incompatible with any form of Genuine Modal Essentialism, which requires essences to be context independent (objective).⁵

Furthermore, given the appropriate context, anything (or almost anything) can serve as a counterpart of anything else (or almost anything). However, if counterpart relations are this loose, then individuals have little to no essential properties. I mention the possible restriction on similarity ("almost anything"), because there may be objects that share no qualitative features and lack any meaningful resemblance – perhaps Socrates and the number 2 are such objects. In that case, the number 2 would not be a counterpart of Socrates (and vice versa). However, the vast majority of

⁴ For more details on counterpart theory see (Lewis 1968, 1986; Hazen 1979; Forbes 1982; Divers 2002, Chap. 8; Varzi 2020). For its actualist applications see: (Heller 1998; Wang 2015; Woodward 2017).

⁵ This observation is widespread. See (Lewis 1986, Chap. 4.5; Heller 2005; Mackie 2006, Chap. 1 and 9; Paul 2004, 2006; Beebe and MacBride 2015).

individuals are not like that, and share at least some qualitative properties, meaning that they can be linked through counterpart relations.

One way to address the problem of excessively loose counterpart relations is to restrict the number of counterpart relations. From the perspective of a qualitative metaphysics of possible worlds in the style of Lewis, the most natural approach would be to ground counterpart relations in perfectly natural (fundamental, sparse) properties, allowing only these to serve as the basis for qualitative similarity. This restriction would help preserve genuine essentialist claims, as individuals would retain essential properties in the form of fundamental qualitative properties.⁶

A problem with this view is that it restricts the analysis of modal properties to individuals that exemplify only fundamental properties, making essentialism true only in the context of fundamental individuals. However, if essentialism is to be a meaningful doctrine, it should also apply to non-fundamental individuals that possess less-than-perfectly-natural essential properties. After all, many of the most well-known and intuitively plausible examples of essential properties – such as *being human*, *being composed of a particular lump of matter m*, or *being born from specific gametes a and b* – are not perfectly natural properties.

One way around this problem could be to reduce non-fundamental properties to fundamental ones. This would allow one to consistently maintain that only fundamental properties are relevant for counterparthood since counterpart relations among non-fundamental individuals would metaphysically follow from those among fundamental individuals. However, this approach requires providing reductive analyses of all non-fundamental properties – such as biological, modal, moral, psychological, or social properties – in terms of fundamental, presumably physicalist, properties. Given the challenges of such reductions (it is difficult to find non-controversial examples) and their frequent incompleteness (see Merricks 1998; Sider 2013, sections 7.4, 7.6 and 12.9; Chalmers 2012, sections 1.2, 1.3, and 8.2, Glazier 2022), many non-fundamental properties would be deemed irrelevant for counterparthood, leaving the modal properties of many non-fundamental individuals unexplained. For these reasons, I believe that restricting

⁶ This kind of strategy of reconciling the Qualitative Counterpart Theory with Genuine (Modal) Essentialism has been proposed by Buras (2006).

similarity relations to a narrow set of qualitative properties is not a promising strategy for reconciling Qualitative Counterpart Theory with Genuine Modal Essentialism.

Let us now turn to the issue of the inconstancy of *de re* modalities, which would occur even when similarity relations were restricted to a narrow set of qualitative properties.

The most promising way to address this problem – and to reconcile Qualitative Counterpart Theory with Genuine Modal Essentialism – has been proposed by Laurie Paul (Paul 2004, 2006). According to Paul, individuals are bundles of core properties (which are non-modal and purely qualitative) and *de re* representational properties (which are analysed in terms of counterpart theory). The *de re* modal properties of individuals, including their essential properties, are explained by the combination of core and *de re* representational properties. For example, Socrates is essentially human because humanity is among his core properties, which in turn prevents him from being *de re* represented as non-human (i.e., none of his counterparts are non-human).

Paul acknowledges (2006, 351) that counterparthood is highly permissive – we can, in principle, treat almost anything as similar to anything else. Consequently, counterpart relations are not restricted to a special range of qualitative relations. She also recognizes that our modal judgments are context-dependent, meaning that which individuals we consider similar may change depending on the context. Yet, she maintains that the multiplicity and variability of counterpart relations can be reconciled with Genuine Modal Essentialism.

As Pauls suggests, this can be done if we endorse unrestricted mereological composition: any combination of core and *de re* representational properties constitutes a distinct individual. This entails the existence of a plenitude of objects, many of which extensively overlap. For instance, at the location of your table, there exist countless tables that differ merely modally, as well as table-like objects that vary in both core and modal properties.

The plenitude of objects provides the resources to explain the phenomenon of inconstancy. If one considers a context in which Socrates has no non-human counterparts and another in which he does, these contexts do not involve a

single individual with shifting essential properties. Rather, they involve two distinct individuals – each sharing the same core properties but differing in their *de re* representational properties. Since *de re* modal properties are determined by both core and *de re* representational properties, these individuals will have different essential properties. Thus, instead of an inconstant attribution of essential properties to one individual, we have a constant attribution of essential properties to multiple, distinct individuals. Let's call this the *plenitude solution* to the problem of inconstancy of *de re* modalities.⁷

Subsequently, Paul views inconstancy as a feature of our language, more precisely, it concerns reference of terms involved in modal statements, rather than of modal facts expressed by those statements. For example, statements like “There is an x such that x is essentially F ” are referentially indeterminate – there are multiple this-worldly candidates for the referent of x . However, while the referent of x may shift from context to context, the truth-value of the statement itself remains constant.

There are several issues with the plenitude solution to the inconstancy of *de re* modalities.

First, this view misrepresents how names function. It implies that all names of ordinary individuals that do not have all of their properties are essentially indeterminate with regard to their referents. This holds even if we restrict our quantifiers to very narrow domains of objects. Suppose I restrict the quantifiers to what happens in my room. Even then, when I say, “The table in my room is wooden,” the name “Table” would refer to many overlapping tables. I could narrow the quantifier even further to range over just one table among the plurality of overlapping tables, but it seems absurd to suggest that our names operate this way. We do not typically

⁷ Many essentialists (Yablo 1987; Leslie 2011; Dorr, Hawthorne, and Yli-Vakkuri 2021) appeal to the plenitude of individuals to address the so-called problem of tolerant essences – the idea that an individual's essence allows for some minimal variation. Tolerant essences underlie Ship of Theseus-style arguments (see also the Adam-Noah scenario; Chisholm 1967), which suggest that if essences permit even slight variation, then individuals possess few, if any, essential properties. While the plenitude of individuals has been used to resolve both the problem of tolerant essences and the issue of inconstant *de re* modalities, these are distinct problems. In this article, I focus solely on the problem of inconstancy.

restrict our quantifiers to such an extreme degree. When I say, “The table in my room is wooden,” I have already imposed a certain restriction on the quantifier’s range. Why should I impose a further restriction on the quantifier if I am not even aware of other tables beyond my own?

Second, restricting quantifiers appears to function in much the same way as restricting counterpart relations. A qualitative counterpart theorist can account for essentialist intuitions by restricting the quantifiers to range over a narrow domain of highly similar individuals. This, in turn, limits the counterpart relations relevant to evaluating a given essentialist claim and makes it true relative to the restricted domain. However, when we speak without such restrictions, almost anything is similar to anything else, and almost no essentialist claim comes out true. Paul’s view does not exclude the possibility of this unrestricted way of speaking, nor does it show that it is illegitimate. If so, there are contexts of discourse – no less natural than others – that, when taken into account in philosophical analysis, undermine Genuine Modal Essentialism.

Third, even if we allow for quantifier restrictions so that, semantically, we can behave as if there were no plenitude of referents for our terms, we are still ontologically committed to a plenitude of overlapping individuals due to the assumption of unrestricted mereological composition.

Of course, such plenitude will provoke many incredulous stares. It seems absurd to assume that at the spatiotemporal location of your table there are countless other tables and table-like objects. Such a belief lacks any intuitive support.

Paul attempts to mitigate this issue by arguing that (2004, 183) differences between overlapping individuals are usually unimportant for evaluating modal statements: regardless of which of the overlapping individuals we consider, the same modal statements will hold true. As a result, semantic indeterminacy does not affect the objective status of *de re* modalities, which remain constant.

However, this does little to resolve the issue. There are still numerous individuals that largely overlap, yet the differences among them affect the truth values of modal statements. Consider Socrates, who has no non-human counterparts, and Socrates*, who does. These individuals share the same core properties and differ only in certain *de re* representational

properties – perhaps just one. Despite this minimal difference, the truth value of the statement “Socrates is essentially human” differs on whether “Socrates” refers to Socrates or to Socrates.*

Paul’s other suggestion (2004, 183) is that, because the plenitude of individuals consists of largely overlapping individuals, they might be treated as “almost” one. She contends that the plenitude of largely overlapping individuals is far less controversial than that of wholly distinct ones.

Yet this overlooks the fact that individuals can overlap in only a minimal way. Suppose x and y each possess 100 core properties but share only one, which need not even be related to their spatiotemporal location. This means Paul’s view introduces a vast number of almost wholly distinct individuals, in addition to the plurality of largely overlapping ones.

Fourth, plenitude implies no individual can stand in conflicting counterpart relations: each distinct way of *de re* representing an individual effectively introduces new individuals that possess the represented features. In other words, no individual can be represented as having different properties than those it has in the initial possible world in which that individual exists. This position thus undermines a fundamental intuition in the metaphysics of modality: that the things we know could have been different from how they actually are.

Fifth, Paul’s view shifts the explanatory role of Qualitative Counterpart Theory in explaining *de re* modality. Instead of explaining an individual’s modal properties through qualitative counterpart relations, it grounds them in the individual’s non-modal core properties. As a result, the Qualitative Counterpart Theory ceases to provide a metaphysical explanation for *de re* modalities, but becomes merely a semantic tool for describing *de re* representational properties. Because of that, even if this view avoided the previously mentioned issues (which I believe it does not), it would render the problem of *de re* representation irrelevant to the question of Genuine Modal Essentialism. Essential properties would no longer be explained in terms of how worlds *de re* represent individuals. Instead, Paul reverses the explanatory order: individuals possess certain *de re* modal properties, and worlds represent them in specific ways because of their non-modal core properties. Thus, ultimately, Paul’s view abandons Genuine Modal Essentialism in

favour of some form of non-modal (Finean) essentialism, according to which an individual's core non-modal properties – those constitutive of its identity – serve as the basis for its modal properties.

As we have seen, the most promising strategy in the literature for reconciling Qualitative Counterpart Theory with Genuine Modal Essentialism is highly problematic. I therefore conclude that, at the present stage of the debate, Qualitative Counterpart Theory cannot be made consistent with Genuine Modal Essentialism. Let us now consider whether Moderate Anti-Haecceitism, modelled on genuine transworld identity, fares any better in this respect.

4.2. Qualitative Genuine Transworld Identity Theory

Another way to adopt a moderate anti-haecceitist stance is to explain *de re* representation in terms of purely qualitative facts about an individual's transworld identity conditions. According to this view, a world *w* (whether genuine or ersatz) represents *de re* that some individual *x* (genuine or ersatz) exists at it if certain purely qualitative conditions are satisfied at *w*. I will assume these conditions involve the exemplification of properties, though they could concern any qualitative building blocks of worlds posited by a given theory of possible worlds.

Taken together, these conditions form a qualitative, necessary, unique (unshareable), and sufficient condition for the existence of *x*, which amounts to *x*'s qualitative individual essence *IE*. Consequently, *x* exists at a world *w* if and only if its *IE* is exemplified at *w*. Likewise, *x* is essentially *F* if and only if *F* is exemplified at *w* and is included in *x*'s individual essence *IE*. Under modal realism, *x* itself exemplifies *IE*, whereas according to ersatzism, it is the ersatz representative of *x* that satisfies *IE*. The specifics of what it means for an ersatz individual to satisfy *IE* will depend on the particular ersatzist theory of possible worlds in question.

This account of *de re* representation is clearly compatible with Genuine Modal Essentialism: (1) the exemplification of qualitative individual essences remains constant, (2) essences are non-trivial, and (3) objectual essentialist statements are factual. However, despite its compatibility with Genuine Modal Essentialism, this account relies on the controversial notion

of qualitative individual essence, which lacks any proponents in contemporary literature. Let me briefly outline some reasons why.

First, accepting qualitative individual essences, entails that individuals obey (qualitative) principle of the identity of indiscernibles (*PII*): For any two individuals x and y , if x and y have the same qualitative individual essence *IE*, then $x = y$. There is however a consensus among contemporary metaphysicians that purely qualitative *PII* is implausible. Arguments against it stem from the field of modal metaphysics (Black 1952; Adams 1979; Stalnaker 2012; Kment 2014; Russell 2015) as well as philosophy of physics (Dasgupta 2009; French 1989; French and Redhead 1988; French and Krause 2006). They show that qualitative duplicates are either possible, actual, or both. If *PII* is defensible at all, it needs to be an impure principle, ranging over partially non-qualitative properties on top of the qualitative ones.⁸ It is safe to say that any plausible essentialist view or an account of *de re* representation should not entail qualitative *PII* and make room for the possibility of qualitative duplicates.

Relatedly, modal arguments suggest that the very nature of qualitative properties – whether understood realistically or nominalistically – makes them inherently shareable among distinct individuals. This is evident in Ship of Theseus-style arguments (Salmon 1986), the Adam-Noah argument (Chisholm 1967), and similar arguments from reduplication and recycling (see Mackie 2006, Chap. 2 and 3).

As a consequence, qualitative properties alone cannot provide sufficient conditions for the existence of individuals. To make essences sufficient, they must be defined at least partially in non-qualitative terms, that refer to specific individuals. This ensures that the possessors of such essences are uniquely tied to particular individuals mentioned by the at partially non-qualitative essences. The most plausible candidates for such essences are origin essences that involve reference to specific gametes or chunks of matter (Kripke 1980, Hawthorne and Gandler 2000).⁹ Another candidate for an unshareable individual essence is *thisness* – a purely non-qualitative

⁸ See (Rodríguez-Pereyra 2022) for a defence of such a variant of *PII*.

⁹ For a critical discussion of origin essentialism see (Robertson 1998; Damjanovic 2010; Janssen-Lauret 2021)

property, such as the property of *being Socrates* (Adams 1979). Clearly, only Socrates can have the property of *being Socrates*.

One possible way to defend qualitative individual essences against these arguments is to construct them from tropes (which are inherently unshareable) rather than from properties. However, this move faces a methodological challenge: such an account of individual essences would be unavailable to those who endorse properties, and the majority of essentialists seem to do so.

A related issue arises concerning modal realism and ersatzism. While a trope-based account of essences would be available to modal realists – McDaniel (2006), for instance, defends a tropistic transworld identity view – it would not be available to ersatzists. Qualitative individual essences are supposed to ground facts about *de re* representation, yet ersatzists hold that it is ersatz representatives (such as names, predicates, properties, or propositions) that persist across possible worlds. Consequently, an ersatzist would need to posit tropistic individual essences for these *ersatz* representatives.

It is however difficult to make sense of such constructs. Suppose, for example, that qualitative properties serve as *ersatz* representatives. What would it mean for a property to have a tropistic individual essence? Perhaps it would involve a trope of necessity or qualitativeness (among other tropes) unique to that property. However, such posits seem to be incomprehensible.

Finally, accepting qualitative individual essences means denying all cases of haecceitist possibilities: if individuals have qualitative individual essences, singular possibilities involving individuals cannot differ with regard to what they say *de re* without differing qualitatively. While this is consistent with the spirit of anti-haecceitism, due to the fact anti-haecceitism based on Qualitative Counterpart Theory is able to account for some of the haecceitist possibilities while maintaining the anti-haecceitist tenet that *de re* representation supervenes on qualitative representation (Lewis 1986; Chap. 4.4; Russell 2015), the Qualitative Genuine Transworld Identity Theory is at a dialectical disadvantage.¹⁰ The proponent of this theory

¹⁰ Qualitative counterpart theorists can achieve that by endorsing a position called *cheap haecceitism*. Briefly put, cheap haecceitism holds that there are more possibilities than worlds: a single world can represent multiple possibilities for a given

should provide very good reasons for the falsity of *all* haecceitist possibilities. However, qualitative individual essences do not constitute such a reason because of their controversial nature.

In light of these remarks, I conclude that although Qualitative Genuine Transworld Identity Theory is congenial to Genuine Modal Essentialism, it entails its highly implausible variant due to the commitment to the notion of qualitative individual essence.

5. Extreme Anti-Haecceitism

According to Extreme Anti-Haecceitism, worlds represent only purely qualitative facts.¹¹ This makes it impossible to make sense of the fact that distinct worlds can represent the same individual x as existing at them – a prerequisite for providing truth conditions for objectual essentialist statements, which is one of the core assumptions of Genuine Modal Essentialism. Extreme Anti-Haecceitism, by contrast, can only account for generic essentialist claims involving the qualitative constituents of possible worlds

individual – Socrates, for example. This occurs when Socrates has multiple counterparts at some world w . Suppose that at w , two indiscernible twins serve as Socrates' counterparts (such a world is guaranteed by the standard characterisation of the principle of recombination). In that case, w represents two distinct possibilities for Socrates – one in which he is one twin and another in which he is the other. These possibilities differ *haecceistically* without differing qualitatively. Thus, even though *de re* representation is necessitated by qualitative counterpart theory, haecceitist possibilities remain genuine. This is why the view is called *cheap haecceitism*. Some (Fara 2009) have argued that cheap haecceitists face difficulties in incorporating the actuality operator into their theory, which is needed to account for the modal character of the actual world. However, see (Stalnaker 2012, Chap. 3 and De 2022) for replies.

¹¹ Such an account of representation of worlds seems highly implausible: the majority of possible worlds theorists after Kripke agree that worlds represent both singular and qualitative facts, not merely qualitative ones. Nevertheless, Extreme Anti-Haecceitism might be the only account of *de re* representation available to metaphysicians who believe that the actual world (reality) is purely qualitative such as generalists (Dasgupta 2009) or ontological nihilist (O'Leary-Hawthorne and Cortens 1995; Diehl 2018).

(whether genuine or *ersatz*). Examples of such claims include “Water is H_2O ” (assuming H_2O is shorthand for a purely qualitative description of hydrogen and oxygen atoms) or “To be human is to be rational.”

An extreme anti-haecceitist can account for such generic essentialist claims either through counterpart theory or by positing genuine transworld identity for the qualitative constituents of worlds. For instance, suppose that the fundamental qualitative elements of worlds (whether genuine or *ersatz*) are properties. In that case, a property P exists at a world w if it has a property counterpart P^* at w , or if something at w satisfies a purely qualitative transworld identity condition C , where C specifies a qualitative individual essence IE of P .¹²

On this basis, one could account for generic essentialist statements about properties as follows: a property P is essentially F if and only if all of its property counterparts are F , or if F is part of its individual essence IE , which is exemplified at w (analogous remarks apply to other potential purely qualitative building blocks of worlds).

The extreme anti-haecceitist might attempt to account for objectual essentialist statements indirectly by paraphrasing them into generic ones. On this approach, both objectual and generic essentialist statements would be factual. Correia (2006) outlines how such paraphrases could work, though he focuses on definitional essentialism rather than Modal Essentialism. But the extreme anti-haecceitist could adapt his method to the modal case.

First, we first paraphrase “Necessarily, Socrates is human” into the partially generic statement “Necessarily, to be Socrates is to be human.” Next, to eliminate the objectual reference to Socrates (and, by extension, any other individual), we replace “Socrates” with a predicate that describes his unique nature – his individual essence, *Socrateity*. This yields the statement: “Necessarily, an exemplification of *Socrateity* entails an exemplification of humanity.” This procedure can then be generalized to all objectual essentialist statements, systematically translating them into generic ones.

However, as we can see, such paraphrases require the introduction of individual essences that serve as proxies for individuals. These individual individuals could be: purely non-qualitative (thisnesses), impure (origin essences), or purely qualitative (qualitative individual essences)

¹² For a development of property counterpart theory see (Heller 2005).

In this case, individual natures cannot be non-qualitative or impure, as their modal representation would require non-qualitative resources – something Extreme Anti-Haecceitism does not permit. Consequently, individual natures must be purely qualitative. However, as we have seen, there are strong reasons to reject purely qualitative individual essences.

The main takeaway from this section is that no form of anti-haecceitism is compatible with a plausible form of Genuine Modal Essentialism:

- (1) Qualitative Counterpart Theory, as I have argued, entails Shallow Modal Essentialism.
- (2) Qualitative Genuine Transworld Identity Theory leads to an implausible version of Genuine Modal Essentialism based on the controversial notion of qualitative individual essences.
- (3) Extreme Anti-Haecceitism either renders objectual essentialist statements non-factual (which implies Shallow Modal Essentialism) or is forced to accept qualitative individual essences, which are highly controversial posits.

Let's now examine whether haecceitist accounts of *de re* representation are more friendly to Genuine Modal Essentialism. As we will see, while Moderate Haecceitism aligns with certain plausible forms of Genuine Modal Essentialism, Extreme Haecceitism leads to Shallow Modal Essentialism. However, I present a way Extreme Haecceitism (which also applies to Qualitative Counterpart Theory) can account for essentialist intuitions, while also accommodating the intuitions underlying the inconsistency of *de re* modalities – something Moderate Haecceitism fails to do convincingly. I will therefore conclude that Extreme Haecceitism (and Qualitative Counterpart Theory) offers a more plausible account of the nature of *de re* representation than Moderate Haecceitism.

6. Moderate Haecceitism

According to moderate haecceitists (Adams 1979; Kripke 1980; Elshof 2000), *de re* representation does not supervene on qualitative representation, meaning that haecceitistic possibilities are genuine. However, not all such possibilities are admissible. While *de re* representation is not strictly

determined by qualitative representation, certain qualitative constraints still limit the range of haecceitistic possibilities.

For instance, although Socrates could swap his qualitative role with some individuals – say, Plato – he could not exchange his qualitative role with just any individual, such as a poached egg or an alligator. This is because he exemplifies certain properties, like *being human*, which, while not sufficient for his existence, are nonetheless necessary. In other words, any possible world that *de re* represents Socrates as existing must also represent him as human.

As before, this view can be formulated either within the framework of counterpart theory or in terms of transworld identity. I will examine each approach in turn and explain how they relate to Genuine Modal Essentialism.

6.1. *Non-Qualitative Counterpart Theory*

According to *Non-Qualitative Counterpart Theory*, counterpart relations linking individuals (whether genuine or ersatz) are non-qualitative rather than qualitative. However, since *de re* representation must be qualitatively constrained, there must also be qualitative limitations on when two individuals count as non-qualitative counterparts.

The central challenge for this view is to explain what grounds the claim that two individuals (genuine or ersatz) qualify as non-qualitative counterparts. Lewis (1986, 229–230) argued that it is difficult to make sense of non-qualitative determinants of counterpart relations. In his view, counterpart relations are only intelligible if they are understood as purely qualitative relations.

This challenge has recently been addressed by Sam Cowling (2012). According to his view, for any individuals x and y , x and y are non-qualitative counterparts if and only some bare particular b overlaps both x and y .

Cowling builds on bare particular theory, which holds that individuals are composed of two entities: *thin particulars* (bare particulars), which are propertyless substrata that individuate objects, and *thick particulars*, which are ordinary individuals identified with the collection of all properties borne by a given bare particular.

With this distinction in place, Cowling argues that although the thick particulars associated with x and y are worldbound, they share a single bare

particular that overlaps both of them in different worlds. This allows him to explain *de re* representation: an individual exists at a world w if and only if w contains its non-qualitative counterpart. From this, we can derive essentialist truths: “Socrates is essentially F ” is true if and only if all of his non-qualitative counterparts are F .

Unfortunately, Cowling’s view is inconsistent with Genuine Modal Essentialism. While it preserves a constant notion of non-qualitative counterparthood (based on the overlap of bare particulars) and treats objectual essentialist statements as factual, it deprives individuals of any informative essential properties. This is because bare particulars, though necessarily bearing *some* properties, are not necessarily tied to any specific properties. Without necessary links between bare particulars and specific qualitative properties, Cowling’s view fails to impose specific qualitative constraints on *de re* representation. Consequently, individuals lack substantive qualitative essential properties, and the view collapses into a form of extreme haecceitism.

Moreover, as with the issue of tropistic qualitative individual essences discussed earlier, Cowling’s approach seems to lack broad applicability: applying his framework to the ersatzist ontology would require positing that singular abstract representatives (such as names or singular propositions) possess bare particulars, an idea that is difficult to make sense of.

On top of that, my general problem with defining non-qualitative counterpart relations through overlap of non-qualitative elements of worlds (genuine or representational), is that it seems to transform counterpart relations into relations of transworld identity. But counterpart relations cannot be identity relations, as they have distinct logical properties: whereas identity is transitive and symmetric, counterpart relations are intransitive and asymmetric. These differences are crucial, as counterpart theory is often used to solve problems that transworld identity cannot. For instance, counterpart theory can help us explain the conditional nature of modal thoughts (Mackie 2006, Chap. 9; Lewis 1986, Chap. 4.5), contingent identity and puzzles of material constitution (Gibbard 1975) or issues associated with the problem of personal identity (Lewis 1971).

Despite these concerns, some philosophers *do* treat counterpart relations as identity relations (Hazen 1979; Stalnaker 2003; Varzi 2020). On this view,

two individuals x and y (genuine or ersatz) are non-qualitative counterparts if and only if they are identical. Identity is just a particularly strict form of counterpart relation.

As suggested by Stalnaker (2003, Section 4), even if the counterpart relations are identity relations, they retain the applications of counterpart theory mentioned above if the notion of absolute identity is replaced by the notion of conditional identity. Conditional identity holds only under certain conditions, meaning that an individual can be identical to another under one condition (a given set of worlds) but distinct under another (a different set of worlds). This however is consistent with some individuals being unconditionally identical, or more precisely, identical across all worlds (perhaps necessary beings, like numbers, are identical in this sense).

While this explanation of the nature of non-qualitative counterpart relations is coherent, it is unfortunately inconsistent with Genuine Modal Essentialism. This is because the use of the notion of conditional (contingent) identity reintroduces inconstancy: if identity is conditional, it might be true that Socrates is identical to some human (himself or someone else) under certain conditions, but under others, he could be identical to an alligator or a poached egg.

A possible response is to impose constraints on conditional identity to ensure that, under no conditions, Socrates is identical to an alligator. This would require Socrates to necessarily exemplify certain qualitative or impure properties that prevent such identity claims.

The problem with this solution is that it relies on the notion of unconditional identity, which was initially set aside. Socrates is unconditionally identical (relative to the set of all possible worlds) to some human because he necessarily (essentially) possesses some property F – rationality, for instance – that precludes his identity with non-humans (assuming only humans are rational beings). To systematically avoid inconsistency, a similar procedure must be applied to every other individual. Consequently, a non-qualitative counterpart theorist who interprets counterpart relations as identity relations cannot successfully reconcile her view with Genuine Modal Essentialism without reintroducing unconditional identity – thereby transforming her position into the Genuine Transworld Identity Theory.

Let us, then, consider a variant of Moderate Haecceitism that explicitly adopts the framework of Genuine Transworld Identity Theory.

6.2. Non-Qualitative Genuine Transworld Identity Theory

Another way to adopt Moderate Haecceitism is to explain *de re* representation in terms of impure (partially non-qualitative and partially qualitative) transworld identity facts, which describe impure individual essences of individuals. I will call this view *Non-Qualitative Genuine Transworld Identity Theory*. According to this view, a world w (whether genuine or ersatz) represents *de re* that some individual x (genuine or ersatz) exists at w if and only if an impure individual essence IE is exemplified at w . In the case of modal realism, x itself exemplifies IE at w , whereas in the case of ersatzism, it is x 's non-qualitative representative that satisfies IE (what it means for a non-qualitative representative to satisfy IE will depend on the specific ersatzist theory of representatives).

The non-qualitative part of IE can involve reference to a genuine individual (in the case of modal realism) or its non-qualitative surrogate, such as thisnesses or names (in the case of actualism). The qualitative part of IE involves reference to properties that are necessarily exemplified by x itself or by its non-qualitative representative. An example of an impure individual essence might be an origin property, such as originating from gametes a and b (where origination is a qualitative relational property, while " a " and " b " refer to particular individuals or their non-qualitative representatives).

Subsequently, the moderate haecceitist can explain essentialist attributions: x is essentially F if and only if, at every world where a certain impure individual essence IE is exemplified, F is also exemplified.

Of all the explanations of *de re* representation discussed so far, this one seems the most promising from the perspective of the genuine modal essentialist. It (1) avoids the inconstancy of *de re* modalities, (2) ensures that essences are informative, and (3) keeps objectual essentialist statements factual. Moreover, it does not require purely qualitative individual essences, avoids commitment to qualitative PII , and allows for some haecceitist possibilities – those that are consistent with the qualitative or impure constraints imposed on *de re* representation.

Since I plan to compare this view with Extreme Haecceitism, I will first present its extreme counterpart and then offer a comparison.

7. Extreme Haecceitism

According to Extreme Haecceitism (Salmon 1996; Mackie 2006, Chap. 9), *de re* representation is metaphysically independent of qualitative representation. As a result, *de re* representation is not constrained by qualitative factors, or these constraints are minimal. Therefore, any individual can be *de re* represented as having any, or almost any, qualitative character.

As mentioned earlier, Extreme Haecceitism can take either a counterpart-theoretic or a transworld identity form. In what follows, I do not discuss them separately because, as noted above, Non-Qualitative Counterpart Theory ultimately requires counterpart relations to be understood as identity relations. Thus, both counterpart-theoretic and transworld identity variants of Extreme Haecceitism will tell the same story, though within different semantic frameworks.

Extreme Haecceitism asserts that *de re* representation is explained by purely non-qualitative facts about the transworld identity of genuine individuals or their ersatz representatives. Specifically, an individual x exists at world w if and only if it is x itself or its non-qualitative representative that exists or is satisfied at w . Since there are no necessary links between individuals (or their non-qualitative representatives) and qualitative properties (or qualitative representatives of qualitative elements of worlds), individuals lack any essential properties. This leads to Shallow Modal Essentialism.

However, this view seems absurd. It implies that any individual can be *de re* represented with any qualitative character – Socrates, for example, could be a number 2 or a musical performance. This seems highly counter-intuitive.

Extreme haecceitists (Mackie 2006, Chap. 9) acknowledge this problem and agree that *de re* possibilities must be somehow restricted to avoid such absurdities and make their view more reasonable. A solution is to introduce minimal essentialist constraints on *de re* representation.

The minimal constraints are different in two ways from the usual necessary qualitative constraints of Moderate Haecceitism:

- (1) They are generic rather than objectual: The constraints apply to kinds of individuals rather than specific individuals. For example, Socrates cannot be the number 2 because it is true of a natural kind *human being* that human beings are essentially mammals.
- (2) They are conceptual rather than substantial: At least some of the minimal constraints can be identified through the conceptual analysis of general concepts such as *concrete individual*, *event*, or *abstract entity*. For instance, Socrates cannot be number 2 due to the conceptual truth that every concrete individual is essentially concrete, spatiotemporal, or something along these lines.

Because of these features, minimal constraints appear less epistemically demanding than the more substantial constraints of the moderate haecceitist, as they do not require a sophisticated epistemology of essence.

Overall, Extreme Haecceitism allows for numerous haecceitist possibilities (except those ruled out by the minimal constraints) while avoiding commitment to qualitative *PII* and to qualitative or impure individual essences. However, since its essentialist constraints are minimal rather than informative and generic rather than objectual, it fails to satisfy two of the three tenets of Genuine Modal Essentialism. Consequently, Extreme Haecceitism entails Shallow Modal Essentialism.

8. Genuine Essentialism or Inconstancy?

As we can see, anyone who wishes to maintain a convincing version of Genuine Modal Essentialism – one that avoids commitment to qualitative individual essences and related controversial theses – must adopt a moderate haecceitist account of *de re* representation modelled on a Non-Qualitative Genuine Transworld Identity Theory (with qualitative constraints).

The main difficulty facing Moderate Haecceitism, however, is its inability to explain the phenomenon of the inconstancy of *de re* modalities. In Section 4.1, I argued that Qualitative Counterpart Theory gives rise to such inconstancy. Yet this inconstancy is not merely a feature of Qualitative Counterpart Theory; it is an independent phenomenon with strong intuitive foundations. If so, any satisfactory theory of *de re* modality should be able

to account for it. Let me briefly indicate some aspects of our modal reasoning that reveal this variability in our modal judgments.

First, when considering singular possibilities for an individual, we often focus on how they could *become* different rather than how they *could have been* different (Mackie 2006, 156). For example, asking whether Socrates could be an alligator typically means considering whether he could transform into one during his actual existence. In this context, we keep certain properties fixed, ensuring his persistence in the actual world. In such a case, he obviously could not become an alligator. However, the ways in which Socrates *could have been* far exceed the ways in which he *could become* in a world where he already exists: there are plenty of conceivable worlds at which Socrates is non-human, e.g., a world at which he is transformed into an alligator by a wizard.

Second, we often think about modality conditionally – what would happen if certain properties were different. For instance, “If that player had won this match, he could have had a great career.” In Lewisian counterfactual semantics, such statements are true if, in the closest possible worlds where the antecedent holds, the consequent also holds. This shows that the antecedent determines the relevant range of worlds for evaluating the counterfactual.

Third, modality comes in degrees (Kment 2014). We commonly say things like “That team almost won” (indicating a near possibility) or “It’s practically impossible for me to live forever” (suggesting extreme unlikelihood).

Fourth, many possibilities assume fixed causal powers or dispositions. Could Socrates be the fastest runner on Earth? If his actual abilities remain unchanged, then no. But in a more distant world where his dispositions are different, he could be. Similarly, when considering physical possibilities, we often hold natural laws fixed. With such constraints, anything with mass cannot exceed the speed of light. However, in worlds with appropriately different or changed laws, objects with mass could move faster than the speed of light.

We are thus confronted with two opposing yet equally compelling intuitions: the essentialist intuition, which asserts that individuals have objective, non-trivial essences that determine their identity and persistence conditions, and the intuition of inconstancy, which holds that an individual’s

modal properties depend on context. This presents a choice – should we prioritize the essentialist intuitions underlying Genuine Modal Essentialism, or those supporting the inconstancy of *de re* modalities?

I believe that we do not have to give up either of these intuitions, but can satisfy both.

The key advantage of Extreme Haecceitism (and Qualitative Counterpart Theory) over Moderate Haecceitism is its ability to account for inconstancy while still accommodating essentialist intuitions in a theoretically parsimonious way. By contrast, Moderate Haecceitism either ignores our intuitions about the inconstancy of *de re* modalities or explains them only at significant theoretical cost. To account for them, a moderate haecceitist might adopt Paul's plenitude-based explanation of inconstancy and adapt it to a transworld-identity account of *de re* representation. As noted in Section 4.1, however, the plenitude strategy appears to be the only currently available way for genuine modal essentialists to reconcile their position with the phenomenon of inconstancy. Yet this approach faces several serious difficulties, including: (1) commitment to an enormous number of overlapping individuals, (2) a misrepresentation of how names refer, (3) failure to account for the modal variability of individuals, and, ultimately, (4) the abandonment of Modal Essentialism.

By contrast, the extreme haecceitist (as well as the qualitative counterpart theorist) can readily accommodate inconstancy while still accounting for essentialist intuitions in a parsimonious way. As Mackie (2006, 154–156) argues, this can be achieved by introducing the notion of quasi-essentiality: a property *F* is quasi-essential to *x* if considering *x* as non-*F* requires shifting to a very remote possible world relative to the world at which *x* exists. (The counterpart theorist can adopt this notion as well.)

A key feature of quasi-essentiality is that it admits of degrees. Suppose *x* exists at world *w*. If, at a very close world *w'*, *x* lacks *F*, then *F* is quasi-essential to *x* only in a minimal sense. Conversely, if *x* lacks *F* only at very remote worlds relative to *w*, then *F* is strongly quasi-essential to *x*. Intuitively, in such a case it is difficult to conceive of *x* as non-*F*. Whether *F* is minimally or strongly quasi-essential thus depends on the range of worlds under consideration. This flexibility allows quasi-essentiality to account for the inconstancy described earlier.

At the same time, it preserves the core applications of Genuine Modal Essentialism. Like genuine essential properties, quasi-essential properties can ground an individual's identity and persistence conditions. They are also informative (non-minimal) and non-trivial. In effect, objectual essentialist statements remain factual. The notion of quasi-essentialism can also support standard modal arguments for identity and non-identity often proposed by genuine essentialists (see Mackie 2006, 161). For example, pain is strongly quasi-essentially experienced by us, whereas a certain neural activity *A* that is supposed to be a biological foundation of pain is not. In other words, imagining a world where *A* is experienced introspectively by us requires considering a very remote world from the actual world *w@* (or any other world that we stipulate to be the centre of our modal evaluations). Due to this modal difference, pain is not identical to *A*.

To fully grasp the concept of quasi-essentiality, we need to define the notions of *closeness* and *remoteness* between possible worlds. Intuitively, the more elements two worlds share (or, in the semantic setting, their domains of quantification), the *closer* they are to each other; the fewer they share, the *more remote* they are. For instance, a world *w* at which Socrates is a talking donkey is remote from *w@* because many facts about Socrates, his history, properties, and relations are absent at *w*. Also, certain laws of nature (e.g., biological ones) would differ at *w* (as they would allow donkeys to talk). In contrast, a world at which Socrates is a tax collector is close to *w@*, because it shares with *w@* all the laws and the majority of facts about Socrates and remaining individuals.

These notions are not *ad hoc*. Closeness and remoteness between worlds are widely employed in modal metaphysics and beyond, for instance in analyses of counterfactuals, causation, probability, and epistemic notions such as knowledge and justification.

The distinction between closer and more remote worlds implies that modal claims are always relative. Whether a modal statement (including objectual essentialist claims) is true depends on which worlds are taken into account. For example, [Socrates is essentially human] is true if we restrict our evaluation to worlds close to *w@*, but false if we consider more remote worlds with different biological laws. In this sense, it is quasi-essentially

true that Socrates is human: imagining him as non-human requires considering a very distant world relative to $w@$.

This relativity does not make *de re* modalities non-factual. They remain factual, and thus one of the desiderata of Genuine Modal Essentialism is preserved. What varies is which worlds – and thus which facts – are relevant to a given evaluation. Within a given context, the truth of a modal claim is objective: it is fixed not by us, but by the structure of the worlds themselves. Moreover, we do not create these contexts; the closeness or remoteness of worlds is determined by metaphysical facts about their constituents.

Theories that appeal to relative modalities are sometimes criticized on the grounds that they force a weakening of modal logic. This concern typically arises when the accessibility relation between worlds is restricted so that not every world is accessible from every other world. Since the notions of closeness and remoteness between worlds may appear to impose precisely such restrictions, the present view might seem to have this consequence.

However, the metaphysics of possible worlds developed here is independent of the semantic interpretation of modal logic, including questions concerning the nature of the accessibility relation and which system of modal logic is correct. Closeness and remoteness are metaphysical features of worlds, whereas accessibility is a component of the semantic framework used to interpret modal operators. As a result, one may accept a metaphysics in which worlds differ in proximity while still maintaining that every world is accessible from every other world. Nothing in this view therefore requires any weakening of modal logic, and even S5 remains compatible with it.¹³

¹³ For instance, as noted by Lewis (1968), Qualitative Counterpart Theory (*qua* metaphysical theory of *de re* representation) can be made consistent with whatever modal logic one prefers, depending on what constraints are imposed on the qualitative counterpart relations. Genuine Transworld Identity view seems to be equally flexible.

9. Conclusion

As we can see, the choice between Moderate Haecceitism, on the one hand, and Extreme Haecceitism or Qualitative Counterpart Theory, on the other, ultimately depends on whether one finds the quasi-essentialist or the plenitude position more persuasive. In light of the problems identified above for Paul's plenitudist solution, the quasi-essentialist view appears more promising (though a separate paper developing it in more detail may be required). Admittedly, endorsing this view requires the modal essentialist to make some concessions to Shallow Modal Essentialism. However, so long as most of our essentialist intuitions are preserved, this approach is more compelling than trying to save Genuine Modal Essentialism by invoking a plenitude of overlapping individuals.

This conclusion may not satisfy all genuine modal essentialists. One possible path for those unconvinced by the notion of quasi-essentiality is to reject the possible-worlds framework altogether. In doing so, the problem of *de re* representation would no longer arise for Modal Essentialism. They might instead treat the modal character of essential properties as primitive, or analyse it in terms of potentialities, dispositions, or causal powers inherent in individuals. Alternatively, essence could be understood in entirely non-modal terms. Given the current state of the literature, however, it remains unclear whether such approaches can adequately address the problem posed by the inconstancy of our modal intuitions. One advantage of the possible-worlds framework is that it provides a simple and systematic explanation of the relativity of our modal judgments.

Acknowledgements

I would like to thank the participants in the Eidos seminar at the University of Geneva (Spring 2022), including Martin Glazier, Giovanni Merlo, and Robert Michels, for their insightful comments on an earlier version of this paper. I am especially grateful to Fabrice Correia for reading the entire manuscript and offering extremely helpful feedback.

Parts of this paper were presented at the SOPhA 2018 and 2019 conferences (Salzburg, Austria) and at Issues on the (Im)possible VI (Bratislava, Slovakia). I thank the audiences at these events for their valuable comments, especially Michael

De (my commentator at Issues), Sonya Rocca-Royes, Gonzalo Rodriguez-Pereyra, Martin Vacek, and Michael Wallner.

I am also grateful to the participants of the SemDok seminar at the Department of Philosophy, Jagiellonian University, for their helpful comments on earlier drafts of this article, especially Marek Gurba, Sebastian Kołodziejczyk, Błażej Mzyk, Błażej Skrzypulec, and Przemysław Zawadzki.

Funding

This paper was funded by the National Science Centre in Poland. Grant No. 2023/48/C/HS1/00253.

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Five Problems for Five-Dimensionalists

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Received: 10 March 2025 / Accepted: 21 January 2026

Abstract: Five-dimensionalism is the view that ordinary objects don't just have spatiotemporal (four-dimensional) parts, they also have modal (fifth- dimensional) parts “stretched” across possible worlds. This paper presents five problems for this five-dimensionalist view.

Keywords: Extended modal realism; five-dimensionalism; counterpart modal occurentism; modal dimensionalism.

1. Introduction

In the past twenty years, the metaphysics literature saw the emergence of a view that combines the conceptual resources of Lewisian modal realism and four-dimensionalism (packaged with eternalism and perdurantism).¹ This view has been called by many names, e.g., “counterpart modal occurentism” (Varzi, 2001), “extended modal realism” (Yagisawa, 2010), and “(extended) modal dimensionalism” (Vacek, 2019). However, one name seems to have stuck, viz., “five-dimensionalism” (or 5D, for short) (Graham, 2015).

¹ Such a packaged four-dimensionalist view is defended by people like Sider (2001).

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5D is the view that ordinary objects don't just have spatiotemporal (fourdimensional) parts but also modal (fifth-dimensional) parts. For friends of this 5D picture ("5Ders" as I'll call them), this means that aside from having parts extended in space and time, objects also have modal parts that are somehow "stretched" across possible worlds.² Thus, according to 5Ders, since I could have been a professional footballer (instead of being a lowly philosophy professor), I have a modal part that is enjoying the life of a professional footballer somewhere in the vastness of logical (hyper) space.

5Ders have offered several arguments in favour of their view. For example, Graham (2015) argues that the 5D view provides a "unified and elegant solution" to the puzzles of transworld identity. On the other hand, Yagisawa (2017) argues that it preserves the "absolute conception of possibility" and the truth of the S4 axiom (i.e., the axiom that tells us that whatever is possibly possible is possible). These arguments share the same (Lewis-style) cost-benefit form: "the theoretical payoff of this account is worth the high ontological cost" (Jago, 2013).

I don't intend to challenge these arguments in this paper. Rather, I aim to raise issues about the 5Ders' metaphysical picture. In particular, I present five cases that 5Ders might have problems accounting for, given their metaphysical picture. These are (arranged by level of difficulty) (i) the case of non-existing parts, (ii) the case of impossible parts, (iii) the case of necessary parts, (iv) the case of dis-unified modal parts, and (v) the case of jumping parts.³ I consider and reply to possible rejoinders that 5Ders may give in response. Before getting into this, however, let's first get a conceptual handle on the metaphysical picture that 5D paints us.

² Some 5Ders (like Yagisawa (2010)) use the term "modal *stages*," instead of "modal *parts*." Since I don't intend to make any important philosophical distinction between modal stages and modal parts, I'll use the latter term throughout this paper.

³ Case (iii) has already been raised by Jago (2013), an early critic of 5D. My original contribution to this discussion is the other cases.

2. The Five-Dimensional Picture

We all know who Pelé is. He was one of the – if not *the* – greatest footballer(s) of all time. However, instead of being a world-famous footballer, Pelé might have been a restaurateur in Brazil. Thus, while it's true that Pelé *was* a world-famous footballer, it's also true that he could have been a restaurateur in Brazil.

In standard possible-worlds analysis, “Pelé could have been a restaurateur in Brazil” is true just in case there's a possible world where he (or his counterpart) is a restaurateur in Brazil.⁴ This analysis is straightforward, *possibilia* are just facts in some possible world.

Matters, however, are a bit complicated in the 5D picture. For 5Ders, “Pelé could have been a restaurateur in Brazil” is true because he has two modal parts: a modal footballer part who is famous in some world (viz., our “actual” world) and another modal restaurateur-in-Brazil part in some other possible world.

The metaphysical picture that 5Ders paint extends the one that fourdimensionalists (4Ders) have painted. In the 4D picture, ordinary objects are spacetime worms, having spatiotemporal parts. The 4D view is standardly packaged as a block view of reality, in which the past, present, and future are equally real (aka an eternalist theory of time) and in which things persist by perduring or by having temporal parts (aka a perdurantist theory of persistence).⁵ For instance, Pelé is a spacetime worm whose parts are stretched across a particular spacetime bit in our 4D world. Accordingly, he has a spatiotemporal part on the 23rd of October 1940 (his date of birth), a spatiotemporal part in 1958 (which played at the World Cup in Sweden), and a spatiotemporal part in 1997 (which served as the Brazilian Minister of Sports). All these spatiotemporal parts (and many more besides) are parts of the Pelé's spacetime worm in this world.

⁴ I won't delve into the Lewis-Kripke debate about transworld identity here, as it has no bearing on the points proposed in this paper. For an overview of this debate, see Mackie and Jago (2022).

⁵ The idea of a “packaged view” here follows Chalmers's discussion in (2012, §7.11).

In the 5D picture, objects are 5D objects whose respective modal parts are spacetime worms in some 4D worlds. For example, aside from his spatiotemporal parts, Pelé also has an infinite number of (or at least finitely many) modal parts stretched across some segment of logical (hyper) space. So, Pelé doesn't only have a world-famous footballer modal part in our 4D world and a restaurateur-in-Brazil modal part in some other possible 4D world, he also has a novelist-extraordinaire-in-Paris modal part in yet another 4D world, and yet another modal part in some further 4D world, *et sic porro*.

We could think of a 5D object here as a metaphysical "starfish," where each of its arms (or spines) represents a 4D spacetime worm. And much like how 4Ders take the whole of spacetime as an enormous 4D worm, composed of all little 4D worms, 5Ders take the whole of logical (hyper) space as a gigantic 5D starfish, composed of all little 5D starfish.

3. The Five Problems

The 5D picture is as bizarre as it sounds. It's ontologically committed to modal parts existing across possible worlds. As Lewisian modal realists, 5Ders also believe that these worlds are plentiful and causally isolated. Moreover, since the 5D view is just an extension of the 4D view, it follows that each 4D world is a non-empty block universe in which eternalism and perdurantism prevail. 5Ders believe that their metaphysics' weirdness is not a steep theoretical cost to pay if it can lead us to a metaphysical paradise – a paradise free of the puzzles of material constitution (Graham, 2015) and where the absolute conception of possibilities holds (Yagisawa, 2017).

However, since the promised paradise implies that 5D starfish have modal parts (arms) spread across the vastness of logical (hyper) space, it might have problems accounting for the following seemingly genuine "modal parts."

First, consider the case of non-existent modal parts. For instance, consider the simple modal non-existence claim, "Pelé might not have existed." This might be true either (i) because the facts of some world partially determine Pelé's (possible) non-existence – thus, "Pelé might not have existed, had some facts in a world not happened" – or (ii) because of the

nonexistence of a whole (possible) world itself – thus, “Pelé might not have existed at all, had *some* world not existed.”

Both are counterfactual claims. The former is reasonable enough. Pelé’s (possible) non-existence counterfactually depends on some facts in some world. (For instance, had his parents not met, Pelé might not have been born.) However, the latter counterfactual claim is metaphysically demanding: it requires Pelé’s (possible) non-existence to counterfactually depend on the non-existence of a whole (possible) world. More precisely, it seems to demand the existence of an empty world. Construed this way, the latter is a problem for 5Ders’ Lewisian commitment to non-empty worlds.

Second, consider the case of a 5D object having impossible modal parts. This might mean that (i) a 5D object has contradictory properties – e.g., “Pelé could have been a ten-footer under five feet” – or (ii) there’s a natural kind that a 5D object can’t possibly fall under but seemingly could – e.g., “Pelé could have been an alligator” (Plantinga, 1978) – or (iii) there’s a task that a 5D object can’t logically do but seemingly could have done – e.g., “Pelé could have squared the circle” – or, finally (iv), there’s a super-task that a 5D object could have performed – e.g., “Pelé could have beaten the tortoise in a Zeno-like race” (Black, 1951). These impossible modal parts seem “possible” in some absolute sense (Yagisawa, 2010, 2017). So, 5Ders need to account for them.

Third, consider the dual case of necessary modal parts. For instance, consider (i) simple tautologies – e.g., “Pelé could have been a restaurateur or not” – or (ii) weirder “necessary” properties – e.g., “Pelé could have been a restaurateur and $2+2=4$ ” (Restall, 2011) – or (iii) even seemingly modal tautologies – e.g., “Pelé is necessarily or contingently a restaurateur” (Jago, 2013). Since necessities are duals of impossibilities, 5Ders must account for them as well.

Fourth, consider the case of dis-unified (or disjointed) modal parts – i.e., “finer-grained” parts that a 4D (not a 5D) object has. For instance, consider the case of divided (fission) parts – e.g., “Pelé could have *fissioned* in two different possible worlds” (Parfit, 1971) – and the even more fine-grained case of a scattered 4D object – e.g., “Pelé could have been a scattered object across worlds” (Cartwright, 1975). These cases imply that one and the same 4D spacetime worm could have been divided or scattered into different

possible worlds. Since such possibilities are genuine possibilities (hence genuine modal parts), 5Ders must also account for them.

Finally, consider the related case of “jumping” parts – e.g., “Pelé could have been a modal jumper” – where “modal jumping” implies that one and the same 4D spacetime worm jumps from one possible world to another. To make this more vivid, think of how the Flash jumps from Earth 1 to other Earths in *Crisis on Infinite Earths*.⁶ Or think of Evelyn Quan Wang’s surreal “(multi)verse-jumping” in *Everything Everywhere All at Once*.⁷ Or think of how Nemo recalls his alternative lives in *Mr. Nobody*.⁸ These fictional cases evince the possibility of modal jumping. Thus, 5ders need to account for such jumping modal parts as well.

To be clear, these two latter cases amount to the same challenge for 5Ders. Because one and the same 4D object can be scattered in two or more worlds, or jump from possible world to possible world, such possibilities imply that there’s a single branching world or that the possible worlds are somehow connected. The latter contradicts the Lewisian commitment to the isolatedness of worlds. The former dispenses with the Lewisian commitment to a plurality of worlds. Neither option seems friendly to 5Ders.

4. Replies to (Possible) Rejoinders

These five cases serve as a counterexample to the 5D picture. So, how should 5Ders respond?

Regarding the case of non-existent modal parts, 5Ders may argue that this case is misguided. The 5D view doesn’t need empty worlds to account for the truth of contingent non-existence claims. “Pelé could not have existed” is true simply because there are worlds in which Pelé doesn’t exist. Pelé’s (possible) non-existence simply depends on the existence of those possible worlds in which Pelé doesn’t exist. As such, Pelé doesn’t need to have non-existent modal parts to explain why he could not have existed. All that’s needed is the thought that all worlds are non-empty, but some of

⁶ See <https://www.imdb.com/title/tt29195117/>.

⁷ See <https://www.imdb.com/title/tt6710474/>.

⁸ See <https://www.imdb.com/title/tt0485947/>.

them don't contain Pelé. This is all that's needed to explain the truth of "Pelé could not have existed." Thus, empty worlds don't play an explanatory role here.⁹

I reply, however, that this 5D rejoinder seems self-defeating. After all, *if* 5Ders are committed to the view that *all* possibilities of something imply modal parts of that thing, then since it's possible that some contingent thing doesn't exist, there must be a non-existent modal part of that thing.

5Ders may respond that this riposte confuses the referent of a name like "Pelé." If "Pelé" refers to the sum of all the modal parts (i.e., the 5D starfish), then "Pelé could not have existed" would be true only if he has a non-existent modal part. But this is not what "Pelé" refers to in the contingent non-existence claim like "Pelé could not have existed." It only refers to the actual footballing god we all admire. To account for the truth of such a claim, all that's needed is for there to be a non-empty world (which is included in all possible non-empty worlds) in which Pelé doesn't exist.

To this response, I'll say fair enough. However, it opens 5Ders to a further riposte, for if the Pelé referred to in "Pelé could not have existed" is the 5D starfish itself, then 5Ders would have now to accept the existence of non-existent modal parts; thus, they must accept, *contra* their Lewisian commitment, empty worlds.

Regarding the case of impossible modal parts, 5Ders may say that just as we can extend modal semantics to include *impossibilia* (or impossible worlds), so can we extend 5D to include impossible parts. This is the claim of 5Ders who subscribe to the Extended Modal Realism (EMR) of Yagisawa (2010) or the Extended Modal Dimensionalism (EMD) of Vacek (2019).

One upshot of EMR and EMD is an account of Pelé's impossible parts. "If it is impossible for an object to have an impossible property G, it has an impossible world-stage [part] that has G" (Vacek, 2019, 73). This means there's an impossible world in which Pelé has contradictory properties or is an alligator. There's also an impossible world in which he squared the circle or completed a Zeno-like supertask.

I reply. A metaphysics of *possible* worlds is a hard enough philosophical pill to swallow; what more of a metaphysics of *impossible* worlds? Many

⁹ My thanks to the referee for raising this possible 5D rejoinder.

metaphysicians hold that Lewisian modal realism is already incredulous: extending it to *impossibilia* is even more so.

Of course, 5Ders of the EMR or EMD bent may bite the bullet here. They may argue that appealing to impossible worlds is beneficial and worth the philosophical cost. All I can say is that even if such 5Ders consume an arsenal, it doesn't make EMR and EMD philosophically parsimonious.

How about the necessary parts? 5Ders have a ready account of simple tautologies. They may say that Pelé's restaurateur modal part (in some world) already suffices to make "Pelé could have been either a restaurateur or not" true. This is well and good. But the harder bit for them will be to account for the other sorts of "necessary properties," viz., the bit about Pelé's modal property of being a restaurateur and being such that $2+2 = 4$, and the bit about Pelé being necessarily or contingently a restaurateur. Let's take these two bits in turn.

In standard possible world semantics, the conjunctive property of being a restaurateur and being such that $2+2 = 4$ is true of any (possible) restaurateur like Pelé, since a world in which Pelé is a restaurateur is a world in which $2 + 2 = 4$. But this is weird! What does an arithmetical property (if that's even a "property" at all) have to do with being a restaurateur?

To avoid this bizarre consequence, 5Ders need to distinguish between "being a restaurateur" and "being a restaurateur and being such that $2+2 = 4$." They *might* do this in terms of the notion of "relevance."

Here, 5Ders may employ the semantic resources of relevant logics, like the one proposed by Routley and Meyer (1973). In this semantics, "Pelé could have been a restaurateur and $2 + 2 = 4$ " might be analysed in terms of a world where being a restaurateur is true of Pelé but where $2 + 2 = 4$ is not true. This analysis makes "Pelé could have been a restaurateur and $2 + 2 = 4$ " false. However, it implies that we're in an inconsistent world in which some arithmetical truths aren't true. Some 5Ders might accept this move since they can now distinguish the mundane property of being a restaurateur from the weird conjunctive property of being a restaurateur and being such that $2 + 2 = 4$. However, the philosophical cost here is that 5Ders must subscribe to a metaphysics of inconsistent worlds.

I reply, however, that this is precisely what impossible worlds are doing for EMR and EMD. So, the same parsimony objection against impossible

worlds might be raised against inconsistent worlds. A metaphysics of *possible* worlds is already a hard philosophical pill to swallow; what more of a metaphysics of *inconsistent* worlds?

However, even if we grant that a metaphysics of inconsistent (or impossible) worlds is OK, 5Ders will still find it challenging to account for Pelé's modal property of being necessarily or contingently a restaurateur.

In 5D, "Pelé could have been a restaurateur" means that he has a modal restaurateur part. But is this a necessary or contingent part of Pelé? If it's necessary, then Pelé must be a restaurateur in *all* possible worlds, including ours. But this is false since Pelé isn't a restaurateur in our world. So, Pelé's modal restaurateur part must be contingent. But if this is so, it means that Pelé could have been a restaurateur in some other world, which again means that he has a modal restaurateur part in another possible world. However, we may again ask whether this further modal part is necessary or contingent for Pelé. This now leads to an infinite regress. Thus, even if we grant 5Ders their inconsistent (impossible) worlds, the 5D view might still be incoherent (Jago, 2013).

Now, 5Ders may cry foul, arguing that the dilemma is constructed unfairly. It assumes an underlying modal semantics in which all worlds "see" one another, including itself. That is, it presumes the semantics of S5.¹⁰ But S5 is designed to account for modally extended objects, not un-extended ones. So, "it is not surprising that it turns out not to work for reasoning involving modally un-extended objects" (Yagisawa, 2015). Thus, if 5Ders dispense with the S5 semantics, the dilemma won't be a problem for them since the regress won't be that vicious.

To this, I reply that if 5Ders don't commit to S5, then 5D is a weaker view. It's no longer the view that *all* possibilities of something imply modal parts of that thing. Some 5Ders might find this acceptable, but it makes the revised view *ad hoc*.

Finally, I argued that the cases of dis-unified parts and jumping modal parts imply either a single branching world (which negates the need for a plurality of worlds) or that the worlds are somehow connected (which contradicts the isolatedness of worlds). Now, 5Ders may draw a different moral and say that these cases imply iterated self-referential modal talk, which is

¹⁰ In S5, the accessibility relation of worlds is reflexive, symmetrical, and transitive.

indeed bad for a 5D modal realist. To avoid this, they might subscribe to a hierarchy of world talk (akin to Russell's theory of types).

This hierarchy world talk might look something like this.¹¹ At its ground level are true non-modal sentences, like "Pelé is a world-famous footballer." At the next level are true modal sentences about the subjects of those ground-level sentences, e.g., "Pelé could have been a restaurateur." At the third level are true modal sentences about the predicates of those ground-level sentences, "World-famous footballers could have been restaurateurs." And so on. By fiat, no same-level modal talk is permitted. This, then, bars self-referential modal talk, like "Pelé could have been a modal jumper."

I reply, however, that this kind of hierarchy world talk is again *ad hoc*. Modal jumpers (such as the Flash, Evelyn Quan Wang, or Nemo Nobody) are certainly possible. Heck! We even have movies about them. So, the modal sentence, "Pelé could have been a modal jumper" makes sense. But if this is so, then there *must* be a world in which Pelé is a modal jumper. Or, in 5D terminology, Pelé has a modal-jumping part that jumps between worlds. But now, we're back to the objection that 5Ders must address. If there are disunified or modal-jumping parts, then either there's a single branching world (which again negates the need for a plurality of worlds), or else the worlds are somehow connected (which again contradicts the isolatedness of worlds). To answer this, perhaps 5Ders might drop the commitment to Lewisian modal realism altogether. 5Ders need not be modal realists. They can instead be modal ersatzers or fictionalists. In this way, they need not be committed to the troublesome pluralism and isolatedness of worlds.¹²

However, if this is the 5Ders' only recourse, it doesn't help their cause since the strong analogy between 4D and 5D now fails. Being a non-modal realist 5Der is like being a non-eternalist 4Der. While these metaphysical views are consistent, the 4D and 5D analogy will not be as philosophically tight as before.

¹¹ The same kind of hierarchy world talk might be used to account for the case of non-existent modal parts.

¹² Perhaps 5Ders who subscribe to impossible or inconsistent worlds may go for this option too.

Perhaps 5Ders may issue a final rejoinder. To address all these weird counterexamples, 5Ders must just bar all of them: no to all weird counterexamples, full stop. But this has an easy reply: “OK, then!” But 5Ders must also say “Goodbye” to all kinds of modal talk.

5. Final Thoughts

5Ders want us to go with them to a 5D paradise, where we can swim with 5D starfish and admire their fascinating modal parts. In this paper, however, I presented five reasons why such a paradise might not be a good one to go to, since the promised 5D starfish we can swim with might not even exist in the first place.

Perhaps I’m entirely wrong about the 5D picture. Perhaps 5Ders are pure Lewisians who employ the whole Lewisian metaphysical package: modal realism, the 4D view with perdurantism and eternalism, counterpart theory, universal mereology, nomological Humeanism, and so on. Thus, the five cases I presented here may not be problems for them. Perhaps. But my target 5Ders (viz., Graham, Vacek, and Yagisawa) are the only Lewisians I’m concerned with here. And some of these five cases may still problems for them.

Acknowledgements

A version of this paper was delivered at the Perspectives about Truth III (online) Conference, Politehnica University, Bucharest, Romania, on November 15-16, 2024, and the (Im)possible XI Conference, Institute of Philosophy, Slovak Academy of Sciences, Bratislava, Slovakia, on May 27-29, 2025. My thanks to the organizers and participants of these events. Special thanks to Jonas Amar, Riccardo Baratella, Hazel T. Biana, Ben Blumson, Christabel Cane, Mark Anthony Dacela, Christian Dagon-don, Michael De, Alexandru Dragomir, Brian Garrett, Mark Jago, V. R. Lualhati, Peter Marton, Mi- hai Rusu, Raymond R. Tan, Chris Tillman, Paula Tomi, Michael Wallner, Nathan Wildman, Martin Vacek, Ed Zalta, and the anonymous referee(s) of this journal.

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On Certain Problems of Collisionless Substitution into Double Execution in Transparent Procedural Logic (TPL)

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Received: 21 June 2025 / Revised: 3 February 2026 / Accepted: 12 March 2026

Abstract: The article presents an analysis of rules for collisionless substitution in Transparent Procedural Logic, a new version of Transparent Intensional Logic. The article compares rules for collisionless substitution in Transparent Procedural Logic and the current standard form of Transparent Intensional Logic. The article shows that, in some cases, the current rule for collisionless substitution into double execution in Transparent Procedural Logic creates problems in determining the object v -constructed by the resulting construction.

Keywords: Collisionless substitution; construction; free occurrence of variable; Transparent Intensional Logic; Transparent Procedural Logic; the ramified hierarchy of types.

1. Introduction

Transparent Intensional Logic (*TIL*) is a logical system developed by Tichý (1988). Later, Materna, Duží and Jespersen (2010) developed it into a standard variant of TIL 2010 (*TIL 2010*).

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Recent research on TIL has explored hyperintensional contexts (Duží 2012) and substitution into hyperintensional contexts (Duží et. al. 2010; Duží and Jespersen 2012). TIL 2010 was used to analyse offices (Duží et. al. 2011; Duží and Číhalová 2024), empty names (Kosterec 2023), as a system to investigate structural isomorphism of meaning (Duží 2014), and more.

Kosterec (2020; 2021; 2024, chapter 2.4.3) proved several inconsistencies in TIL 2010, which pose a challenge to the results formulated within that system.¹

These problems were addressed in the subsequent phase of the development of TIL through two approaches. The first was the development of an updated version of TIL 2010 by Duží and Jespersen (Duží and Jespersen 2025), labelled as TIL 2025 (*TIL 2025*)². The second approach to the problems identified in TIL 2010 is Kosterec's system of TIL, introduced under the name Transparent Procedural Logic (*TPL*) (Kosterec, 2024).

TPL shares its basic definitions with Tichý's original formulation of TIL. However, it introduces substantial modifications to the definition of collisionless substitution and to the related notions of displayed/executed and v-executed/v-displayed occurrence of construction. As a result, TPL differs substantially from TIL 2010 and TIL 2025. This paper is concerned exclusively with TPL and does not provide an analysis of TIL 2025.

Collisionless substitution is the main logical operation on which many core theorems of transparent logics depend³. In this article, I demonstrate that TPL does not have clear rules describing changes in underlying constructions in some instances of collisionless substitution into double

¹ The main alternative to TIL 2010 has been Transparent Hyperintensional Logic (*THL*) (Raclavský et. al. 2015, Raclavský 2020). Kosterec (2024, chapter 2.3.5.) proved that similar inconsistencies as in TIL 2010 occur also in THL.

² TIL 2025 differs from TIL 2010 primarily with respect to the definition of Closure and by adopting a more restrictive definition of free variables. In all other respects, TIL 2025 retains the core definitions of TIL 2010 as well as its underlying computational mechanism.

³ These core theorems are *Theorem: Replacement of free Variables*, *Theorem: Compensation Principle*, *Theorem: Restricted validity of β -reduction by name*, *Theorem: Validity of β -conversion by value*, and *Theorem: Validity of α -conversion* (Duží et. al. 2010; Kosterec 2024, chapter 2.2.3.)

execution. I also show that current rules for collisionless substitution into double execution in TPL fails to align with rules governing v-constructing for a double execution in TPL.

This article is structured as follows. In the first part, I briefly introduce the concept of construction with a focus on double execution. The next section explains the concept of collisionless substitution in TPL and how it differs from TIL 2025. Next, I present an example illustrating specific problems in applying the rule for collisionless substitution into double execution in TPL. The article concludes with a brief summary of the main findings.

2. Double Execution in TPL/TIL 2025

The basic concept of TIL/TPL is that of *construction*; in TIL 2025, this concept is denoted under the term *procedure*.⁴ A construction is an abstract procedural object that represents how to obtain a result by a particular procedure [TIL 2025 defines six kinds of procedures: *Trivialization*, *variable*, *Execution*, *Double Execution*, *Closure*, and *Composition*]⁵ Constructions produce an object through v-constructing.⁶ However, it does not mean that every construction must v-construct something every time.⁷ Some constructions do not v-construct anything—they are like dead ends. This feature

⁴ The underlying definitions of procedures in TIL 2025 are largely identical to the definitions of construction in TIL 2010, with the exception of certain modifications concerning *Closure* (Duží and Jespersen 2025, 21).

⁵ In this article, I do not provide the complete definitions of constructions/procedures and v-constructing/v-producing in TIL/2010/TIL 2025. These definitions have already been presented and discussed in several published works, including (Duží and Jespersen 2012; Duží et. al. 2010; Jespersen and Duží 2022; Kosterec 2024; Duží and Jespersen 2025). Therefore, I limit the presentation of the various technical aspects of TPL/TIL 2025 only to the extent necessary for the topic discussed in this article.

⁶ This process of semantic computation of the value of a procedure is called v-producing in TIL 2025 (Duží and Jespersen 2025, 21).

⁷ A letter *v* in the term v-constructing means that constructing is performed under a particular valuation. Valuation is a technical notion in TPL/TIL 2025, a total

enables modelling partial functions in TPL/TIL 2025.⁸ A construction that does not v -construct anything for a given set of parameters [referred to as a *valuation* in TPL/TIL 2025] is called v -improper. If a construction never v -constructs an object under any possible valuation, it is referred to as an improper full-stop (Kostelec, 2024, 29).

TPL adopts the same definitions of construction and v -constructing as Tichý's TIL (Kostelec, 2024, chapter 2.4). These definitions match those in TIL 2025, except for the τ -closure [instead of this type of construction, TIL 2025 defines a similar but different type of procedure called *Closure*]. However, this difference between Closure in TIL 2025⁹ and τ -closure in TPL is not relevant to the analysis undertaken in the present article.

Double execution is a construction/procedure in TPL/TIL 2025 of the form 2X , where X is any entity.

Example 1. Let us have a variable x [also a construction/procedure in TPL/TIL 2025]; then 2x is a double execution. The double execution 2x is a distinct construction from the variable x .

Double execution v -constructs a particular object (if any) according to the following rule:

Definition 1. TPL: Def. v -constructing

Let v be a valuation. Then:

- iv) If X is a construction and X v -constructs a construction Y , then 2X v -constructs the object (if any) that is v -constructed by Y . Otherwise, 2X does not v -construct anything.

This definition implies that, for the double execution 2X to v -construct anything, these conditions must be met at the same time: i) the entity X must be a construction, ii) the construction X must v -construct an object Y that is also a construction, and iii) the construction Y must v -construct

function that attributes value to all variables (Kostelec, 2024, 30; Duží and Jespersen 2025, 11).

⁸ TIL 2025 and TPL are defined over the set(s) of partial functions.

⁹ TIL 2025 employs a modified version of Closure, which differs from Closure in TIL 2010. This difference has significant impact on semantic computation with Closure in TIL 2025 (Duží and Jespersen 2025, 21).

an object. If these conditions are met, then the double execution 2X v -constructs the same object as the one v -constructed by the construction Y . Otherwise, the double execution 2X does not v -construct anything.

Example 2. double executions 2house and 21 do not v -construct anything under any valuation. Why? Because object *house* (physical object from bricks and mortar) and number 1 (mathematical number) are not constructions. Therefore, these double executions are improper full-stop.

What does the double execution 2x v -construct? From definition (iv) *TPL*: *Def. v-constructing* follows that an object v -constructed by the double execution 2X depends on the object that is v -constructed by the construction Y , which is a construction v -constructed by the construction X . Therefore, the answer to this question depends on the object attributed by a valuation v to the variable x . If, according to a valuation v , the variable x does v -construct a construction that is v -improper or improper full stop, then the double execution 2x is v -improper.

*Example 3.*¹⁰ Let us have valuation v , according to which the variable x v -constructs the double execution 21 . Then, under the valuation v , the double execution 2x is v -improper.

Remark 1. The notation $v({}^21/x)$ indicates that the variable x , under the valuation v , has a value of 21 , i.e., the variable x v -constructs the double execution 21

*Example 4.*¹¹ Let us have another valuation v , according to which the variable x v -constructs a variable y and this variable y v -constructs number 1. Then, according to this valuation v , the double execution 2x v -constructs the number 1.

¹⁰ In Example 3, the double execution 21 is the construction of order 1 and higher over B, the variable x is the construction of order 2 and higher over B and the double execution 2x is the construction of order 3 and higher over B in the ramified hierarchy of types.

¹¹ In Example 4, the variable y is the construction of order 1 and higher over B, the variable x is the construction of order 2 and higher over B and the double execution 2x is the construction of order 3 and higher over B in the ramified hierarchy of types.

Remark 2. A sign $\rightarrow_v$ stands for v -constructing/ v -producing in TPL/TIL 2025; therefore, we can represent Example 4 as follows: $x \rightarrow_v y$, $y \rightarrow_v 1$, ${}^2x \rightarrow_v 1$.

The construction Y [in Example 4, the variable y] ¹² may not be explicitly expressed in the construction 2X [in Example 4, the double execution 2x]. If the construction Y is not explicitly expressed in construction 2X , then we may say that the double execution 2X is “built upon” the hidden layer formed by construction Y . Moreover, a double execution can even be ‘built’ on several layers of other constructions. This occurs when the construction X in the double execution 2X v -constructs a construction that is itself double execution, i.e. $X \rightarrow_v {}^2Y$. If this is the case, then to determine an object v -constructed by the double execution 2X , it is necessary to consider additional construction v -constructed by the construction Y .

*Example 5.*¹³ Assume valuation v : $x \rightarrow_v {}^2y$, $y \rightarrow_v z$ and $z \rightarrow_v 1$. From $y \rightarrow_v z$ and $z \rightarrow_v 1$ follows that ${}^2y \rightarrow_v 1$ [according to (iv) TPL: Def. v -constructing an object v -constructed by the double execution 2y is the same as v -constructed by a variable z]. Therefore, ${}^2x \rightarrow_v 1$ [from (iv) TPL: Def. v -constructing follows that an object v -constructed by 2x is the same as an object (if any) v -constructed by 2y].

To determine the identity of an object v -constructed by the double execution 2x , only the object v -constructed by the double execution 2y is considered. The definition (iv) TPL: Def. v -constructing does not establish

¹² Construction Y is expressed in 2X if X is a *Trivialization*. “TIL being a hyperintensional system, each construction C can occur not only in Execution mode to produce an object (if any) when being executed but also as an object in its own right on which other (higher-order) constructions operate. The Trivialisation of C causes C to occur just presented as an argument, as mentioned above. Yet sometimes, we need to cancel the effect of Trivialisation and trade the mode of C for Execution mode.” (Duží and Číhalová 2024)

¹³ In Example 5, the variable z is the construction of order 1 and higher over B , the variable y is the construction of order 2 and higher over B , the double execution 2y is the construction of order 3 and higher over B , the variable x is the construction of order 4 and higher over B and the double execution 2x is the construction of order 5 and higher over B in the ramified hierarchy of types.

a direct connection between the value of the double execution 2x and the value of the variable z . The identity of an object v -constructed by the double execution 2x depends on the value of the variable z only because an object v -constructed by the variable z determines an object v -constructed by the double execution 2y .

If, under some alternative valuation v_i , the variable y would not v -construct the variable z but instead a variable z_i ; then this change would affect 2x only because an object v -constructed by the double execution 2y would depend on an object v -constructed by the variable z_i . Then, according to this new valuation v_i , an object v -constructed by the variable z_i and not the variable z would be relevant to the identity of an object v -constructed by the double execution 2y and therefore the double execution 2x .

What if the variable y does not v -construct the variable z , but a double execution 2z instead? In this case, an additional "layer" of constructions is needed to determine an object v -constructed by the double execution 2x .

*Example 6.*¹⁴ Let us modify Example 5: $y \rightarrow_v {}^2z$, $z \rightarrow_v r$, $r \rightarrow_v 1$. If this is the case, then ${}^2y \rightarrow_v 1$ [from (iv) TPL: Def. v -constructing follows that the double execution 2z v -constructs the same object as v -constructed by the variable r , and the double execution 2y v -constructs the same object as the double execution 2z , namely, the number 1]. At the same time, if $x \rightarrow_v {}^2y$, then ${}^2x \rightarrow_v 1$ [from (iv) TPL: Def. v -constructing follows that an object v -constructed by the double execution 2x is the same as v -constructed by the double execution 2y , namely, 1].

The layered structure of double execution may create difficulties in the application of the rules for collisionless substitution in TPL. These difficulties are illustrated by an example in the following section of the article.

¹⁴ In Example 6, the variable r is the construction of order 1 and higher over B , the variable z is the construction of order 2 and higher over B , the double execution 2z is the construction of order 3 and higher over B , the variable y is the construction of order 4 and higher over B , the double execution 2y is the construction of order 5 and higher over B , the variable x is the construction of order 6 and higher over B and the double execution 2x is the construction of order 7 and higher over B in the ramified hierarchy of types.

3. Collisionless Substitution into Double Execution in TPL

Collisionless substitution in TPL has new rules that differ significantly from those in TIL 2010/TIL 2025. The full definition of collisionless substitution in TPL is as follows:

Definition 2. TPL: Def. collisionless substitution

Let x be a variable, and C and D are any kinds of construction. If x is not free in C , then the result of substituting D for x in C is C . Assume that x is free in C . Then:

- (a) If C is x , then the result of substituting D for x in C is D . If C is 1X or 2X then the result of substituting D for x in C is 1Y , ${}^2Y\{x := D\}$, where Y is the result of substituting D for x in X . ${}^2Y\{x := D\}$ means that all of the free occurrences of x in 2Y are replaced with D .
- (b) If C is $[XX_1 \dots X_m]$, then the result of substituting D for x in C is $[YY_1 \dots Y_m]$, where $Y, Y_1, \dots, Y_m$ are the results of substituting D for x in $X, X_1, \dots, X_m$, respectively.
- (c) Let C be of the form $[\lambda_{\tau x_1 x_m} Y]$; for $1 \leq i \leq m$, let $y_i = x_i$ if x_i is not free in D , and otherwise let y_i = the first variable that ν -constructs entities of the same type as x_i , does not occur or ν -occur in C , is not free in D , and is distinct from $y_1, \dots, y_{i-1}$. Then, the result of substituting D for x in C is $[\lambda y_1 \dots y_m Z]$, where Z is the result of substituting D for x in the result of substituting y_i for x_i ($1 \leq i \leq m$) in Y .

I now provide several examples to better illustrate how collisionless substitution operates in TPL/TIL 2025. Then, I analyse the rule (a) *TPL: Def. collisionless substitution* for collisionless substitution into double execution in detail.

The definition of a free variable is essential to the functioning of collisionless substitution. The first line of *TPL: Def. collisionless substitution* addresses cases in which the variable x , for which the construction D is substituted, is not free in C . If this is the case, then collisionless substitution does not affect the construction C in any way. The result of collisionless substitution of the construction D for the variable x is identical to the construction C .

Remark 3. The notation $C(D/x)$ indicates the collisionless substitution of the construction D for the variable x in the construction C .

Example 7. Let us have valuation v , the construction 0x , and the construction D of any type. The construction 0x is called trivialization in TPL/TIL 2025. The variable x is not free in trivialization 0x [the variable x is *triv*-bound or bound by trivialization in trivialization 0x]. Therefore, the collisionless substitution ${}^0x(D/x)$ results in the construction 0x [by the first line of TPL: Def. collisionless substitution ^{2]}.

Before proceeding, we provide one further example of collisionless substitution in which the variable x is free in the construction C .

Example 8. Let us have valuation v , the variable x and the construction D of any type. Each variable is free in itself. Therefore, the variable x is free in the construction x . A collisionless substitution of the construction D for the variable x results in the construction D [this result follows from the first line of the rule (a) *TPL: Def. collisionless substitution*].

I will now test the application of the rule for collisionless substitution into double execution in TPL by the following example:

*Example 9.*¹⁵ Assume valuation v , under which:

- $2/\tau$
- $x/*1 \rightarrow_v 2$
- $q/*2 \rightarrow_v x$
- ${}^2q/*3 \rightarrow_v 2$

Remark 4. A sign $/$ assigns a type from the ramified hierarchy of types to an entity; in Example 9, these types are: $\tau, *1, *2, *3$.¹⁶

¹⁵ In Example 9, the variable x is the construction of order 1 and higher over B , the variable q is the construction of order 2 and higher over B and the double execution 2q is the construction of order 3 and higher over B in the ramified hierarchy of types.

¹⁶ TIL is an open-ended system. Type τ designates a set of real numbers in the objectual base B . Types $*1, *2, *3$ designates types of constructions in the ramified hierarchy of types. I do not discuss these types in more detail. There are several

In Example 9, the variable q v -constructs the variable x . Therefore, an object v -constructed by the double execution 2q is identical to an object v -constructed by the variable x , namely, the number 2. The variable x is not explicitly expressed in the body of the variable q , or the double execution 2q . In this sense, the variable x is "hidden" within the underlying structure of the double execution 2q .

The collisionless substitution in TIL 2025 affects only explicit parts (sub-procedures) of procedures. Therefore, the result of the collisionless substitution ${}^2q(D/x)$ is the procedure 2q itself in TIL 2025 [since the variable x is not a sub-procedure of the double execution 2q , it does not have a free occurrence in 2q (Duží and Jespersen 2025, 22)].¹⁷

At TPL, the situation differs significantly. TPL introduces a new definition of free variable and free occurrence of variable that differs from the definitions adopted by TIL 2010/TIL 2025. According to this new definition, the variable x has free occurrence in the double execution 2q in TPL.

Furthermore, rule (a) *TPL: Def. collisionless substitution* allows substituting for the free occurrence of a variable x , not only in the double execution 2X , but also in constructions forming "hidden" layers of double execution 2X . Therefore, even if a variable x is not a subconstruction of double execution 2X , we can still substitute for free occurrences of this variable x in constructions underlying the double execution 2X .

Nowhere in the definition is it stipulated that x must be a subconstruction of C . Therefore, the definition also covers v -executed/ v -displayed occurrences as soon as we consider them free/bound. (Kosterec 2024, 120).

sources that provide a detailed explanation of the ramified hierarchy of types (Duží et. al. 2010; Jespersen and Duží 2022, Kosterec 2024; Duží and Jespersen 2025).

¹⁷ This follows from rule *vi*) of Definition 4.7 (Correct collision-less substitution), which states that: *Let x be a variable and C, D procedures. If x is not free in C , then the result of substituting D for x in C is C .* Hence, let the occurrence of x be free in C . *vi*) If C is 2X where X is a procedure, then the result of the substitution of D for x in C is 2Y , where Y is the result of the substitution of D for x in X . (Duží and Jespersen 2025, 24).

This change in the definition of collisionless substitution together with the new definition of free variable¹⁸ constitutes a distinction between TPL and TIL 2025.¹⁹

By rule (a) *TPL: Def. collisionless substitution*, the result of collisionless substitution ${}^2q(D/x)$ is ${}^2q\{x := D\}$, which means that all free occurrences of the variable x in the double execution 2q are replaced by the construction D .

The definition of collisionless substitution in TPL clearly states that in the construction ${}^2q\{x := D\}$,²⁰ the variable x is to be replaced by the construction D , but what exactly does it mean? In Example 9, the variable x is not a subconstruction of the double execution 2q or the variable q . Therefore, the construction D cannot replace free occurrences of the variable x in those constructions. What are other alternatives? Kosterec is not clear on this point, and (a) *TPL: Def. collisionless substitution* is open to several interpretations in that regard.

To further elaborate on this point, instead of the construction D , we consider a collisionless substitution of construction ${}^{12}q$ in Example 9. This

¹⁸ All these changes in the TPL definitions concern the so-called secondary definitions. Kosterec distinguishes between primary and secondary definitions in transparent logics. Primary definitions concern key notions of any system of transparent logic. Primary definitions are definitions of the following: *valuations, constructions, constructing according to valuation, and the ramified hierarchy of types*. Primary definitions are essential for characterizing a logical system as a TIL. According to Kosterec, secondary definitions must correspond to the core definitions of the system. Secondary definitions are *Def. Displayed vs. executed occurrence of a construction, Def. (v-displayed vs. v-executed occurrence of a construction), Def. free variable and Def. collisionless substitution*. The main differences between various transparent logics lie in formulating secondary definitions (Kosterec 2024, 80)

¹⁹ In the following examples, I only state whether a certain variable is free or not according to the rules of TPL. A detailed discussion on the definition of free variable in TPL is not necessary for the topic discussed in the article.

²⁰ The TPL introduces new notation $\{\}$, which is not present in TIL. “It is useful to have a notation to distinguish between constructions that are considered the result of a substitution for variables and those that are not – to make the substitution explicit. I suggest that we use a notation similar to the standard notation for substitution from lambda calculi.” (Kosterec 2024, 173)

kind of construction is called single execution in TPL/TIL 2025.²¹ The single execution ^{12}q v -constructs the same object (if any) that is v -constructed by the double execution 2q , that is, the number 2 [this follows from (iii) *TPL: Def. v-constructing*].²²

The single execution ^{12}q is chosen deliberately because it contains the double execution 2q as its subconstruction. Therefore, the collisionless substitution $^2q(^{12}q/x)$ includes the substitution of the double execution 2q into itself. My challenge with this example is to examine whether the rule (a) *TPL: Def. collisionless substitution* can prevent a vicious cycle in this case.

A vicious cycle occurs when a construction v -constructs itself [or another construction that determines an object v -constructed by this construction]. An example of a vicious cycle is a situation in which $x \rightarrow_v x$. Transparent logics are typed lambda calculi and prohibit these types of constructions by employing a type system called *the ramified hierarchy of types*.²³ Any construction in which a vicious cycle of this kind occurs cannot be correctly typed and thus stands outside the ramified hierarchy of types.

What is the result of the collisionless substitution of the single execution ^{12}q for the variable x in the double execution 2q in TPL? TPL treats the variable x as free in the double execution 2q . Therefore, according to rule (a) *TPL: Def. collisionless substitution*, the result of the collisionless substitution $^2q(^{12}q/x)$ is a construction $^2q\{x := ^{12}q\}$, which means that all free occurrences of x in 2q are replaced with ^{12}q .

The fact that the variable x is not expressed in the double execution 2q or the variable q means that the single execution ^{12}q cannot replace the variable x in either the double execution 2q or the variable q . Yet, according to (a) *TPL: Def. collisionless substitution*, the collisionless substitution of ^{12}q for the variable x in the double execution 2q must affect the resulting

²¹ According to the valuation v in Example 9, the single execution $^{12}q/*4$ is the construction of order 4 and higher over B .

²² This rule states that “If X is a construction, then 1X v -constructs the object (if any) that is v -constructed by X . Otherwise, 1X does not v -construct anything” (Kosterec 2024, 45; Kosterec 2024, 168).

²³ TPL and TIL 2025 employ nearly identical rules for the determination of type in the ramified hierarchy of types (Kosterec 2024, 168; Jespersen and Duží 2025, 13).

construction ${}^2q\{x := {}^{12}q\}$ in some meaningful way. Therefore, the collisionless substitution ${}^2q({}^{12}q/x)$ should yield some changes that would differentiate the construction ${}^2q\{x := {}^{12}q\}$ from the double execution 2q .²⁴ Kosterec does not explain the application of this rule in detail, and to my best knowledge, no material published on TPL discusses this particular example.

There are two possible approaches to the explanation of the rule (a) *TPL: Def. collisionless substitution*. The first possibility is to assume that collisionless substitution for variables that are "hidden" in deeper layers of double execution directly changes the structure of affected constructions.

If we accept this explanation, the single execution ${}^{12}q$ replaces the variable x as an object v -constructed by the variable q in the construction ${}^2q\{x := {}^{12}q\}$. Then, we would need to determine an object v -constructed by the construction ${}^2q\{x := {}^{12}q\}$ under a modified valuation according to which $q \rightarrow_v {}^{12}q$ [instead of $q \rightarrow_v x$ that was stipulated by valuation v in Example 9]. I refer to this explanation as *a static explanation*. If this were the case, then from $q \rightarrow_v {}^{12}q$ it would follow that the object v -constructed by the construction ${}^2q\{x := {}^{12}q\}$ is identical to the object v -constructed by the single execution ${}^{12}q$ [according to rule (iv) *TPL: Def. v-constructing*]. The advantage of *the static explanation* is that it conforms to the general rule for v -constructing for double execution in TPL (iv) *TPL: Def. v-constructing*. In most cases, this explanation would seem preferable, apart from this example, when it inevitably leads to a vicious cycle due to $q \rightarrow_v {}^{12}q$. The variable q cannot be properly typed according to the condition $v({}^{12}q/q)$; therefore, it must stand outside the ramified hierarchy of types. Consequently, under *the static explanation*, the resulting construction ${}^2q\{x := {}^{12}q\}$ would stand outside the ramified hierarchy of types as well [because $q \rightarrow_v {}^{12}q$ is not a construction within the ramified hierarchy of types, it does not v -construct any object; therefore, the construction ${}^2q\{x := {}^{12}q\}$ would not v -construct any object either]. This result is not welcome because it violates the compensation principle in TPL.²⁵ From this it follows that the

²⁴ Kosterec (2024, 173) explicitly reaffirms this observation: “*The result of the collisionless substitution of D for x in C is to be followed by $\{x := D\}$. Then ${}^{20}x$ is not equivalent to ${}^{20}x\{x := D\}$.*”

²⁵ *Compensation principle*: Let C be a construction. Then for any valuation v and a construction D, if D v -constructs an entity d , then $C(D/x)$ v -constructs an entity

construction D cannot be the object v -constructed by X or any other construction, in which D replaces free occurrences of x , in the construction of the form ${}^2Y\{x := D\}$. Therefore, *the static explanation* must be rejected.

The second possible explanation of rule (a) *TPL: Def. collisionless substitution* is to assume that collisionless substitution affects the identity of an object v -constructed by a double execution during individual steps of v -constructing. I refer to this explanation as a *dynamic explanation*. In *the dynamic explanation*, it is still true that $q \rightarrow_v x$ in ${}^2q\{x := {}^{12}q\}$. Only after this step of v -constructing happens [when the variable x has been v -constructed by the variable q], the single execution ${}^{12}q$ instead of the variable x is used to determine the identity of the object v -constructed by the construction ${}^2q\{x := {}^{12}q\}$ [replacement of the variable x by the single execution ${}^{12}q$ thus happens only "after" the variable x has been v -constructed by the variable q . Accordingly, the variable x merely determines the specific step of v -constructing when the single execution ${}^{12}q$ becomes relevant for v -constructing of the construction ${}^2q\{x := {}^{12}q\}$]. Consequently, the assumption of $q \rightarrow_v {}^{12}q$ is not required for the computation of the value of the construction ${}^2q\{x := {}^{12}q\}$, and the vicious cycle of $q \rightarrow_v {}^{12}q$ is thereby averted.

On this point, it is important to read carefully the definition (iv) *TPL: Def. v-constructing*, which states: "If X is a construction and X v -constructs a construction Y , then 2X v -constructs the object (if any) that is v -constructed by Y . Otherwise, 2X does not v -construct anything." (Kosterec 2024, 168). It is the main and only rule for determining the identity of the object v -constructed by any double execution [including a double execution of the form ${}^2Y\{x := D\}$]. This rule explicitly and without exception requires that the construction Y [in Example 9, the single execution ${}^{12}q$] *must be v-*

c iff C $v(d/x)$ -constructs c . (Duží et. al. 2010, 145; Kosterec 2024, 180). We can see that the compensation principle essentially states that if the construction D v -constructs the same object $[D \rightarrow_v d]$ as a certain variable x [i.e., under $(v(d/x))$], then the collisionless substitution of the construction D for this variable x $[C(D/x)]$, should not alter the object v -constructed by construction C into which we substitute construction D for variable x $[C(D/x) \rightarrow_v c]$ and also $Cv(d/x) \rightarrow_v c$. The compensation principle should be valid for any object d and c v -constructed by D and C , respectively.

constructed by the construction X [in Example 9, the variable q] in order to provide a value for an object v -constructed by double execution 2X [in Example 9, the construction ${}^2q\{x := {}^{12}q\}$]. As I show above, this cannot be satisfied in the case of the construction ${}^2q\{x := {}^{12}q\}$. Therefore, although the *dynamic explanation* explains how to apply (a) *TPL: Def. collisionless substitution* in a way that avoids a vicious cycle, this explanation is not compatible with the (iv) *TPL: Def. v-constructing*. We may thus conclude that there is no rule in place in TPL that specifies the single execution ${}^{12}q$ as a source of the identity of an object v -constructed by ${}^2q\{x := {}^{12}q\}$, under the assumption that the replacement of the single execution ${}^{12}q$ for the variable x has occurred “after” the variable x is v -constructed by the variable q .

Therefore, neither of the proposed explanations satisfactorily explains the application of rule (a) *TPL: Def. collisionless substitution* in the case ${}^2q({}^{12}q/x) \leftrightarrow {}^2q\{x := {}^{12}q\}$.

4. Conclusion

The definition of free occurrence of a variable in TPL permits collisionless substitution for occurrences of variables that are not (visible) parts of double execution. Rule (a) *TPL: Def. collisionless substitution* specifies that such collisionless substitution into the “hidden layers” of double execution yields a new construction of the form ${}^2Y\{x := D\}$.

The article shows that TPL provides neither a clear interpretation for the application of this rule nor a clear account of the structure of the resulting double execution. The article therefore proposes two possible interpretations for the application of the collisionless substitution in such cases, which labels *the static explanation* and *the dynamic explanation*.

The article shows that the collisionless substitution under *the static explanation* leads to an inconsistency that violates the compensation principle. By contrast, although *the dynamic explanation* explains how collisionless substitution may be applied in case of double execution without inconsistency, this explanation fails to conform to the general rule for v -constructing for the double execution. Consequently, the article concludes that TPL lacks clear rules for determining an object v -constructed by double

execution of the form ${}^2Y\{x := D\}$. This result poses a challenge for TPL, despite its potential as a promising new system of transparent logic.

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