

Does Definition Admit of Substitution?

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Abstract

This paper is concerned with logical attributes of (real) definition. In particular, I argue that substitution principles give rise to reflexive definitions: cases in which something is directly and exclusively defined in terms of itself. Many maintain that definition is both substitutable and irreflexive, so these standard commitments are at odds. As a corollary, I demonstrate that the claims in ‘Real Definition’ [Rosen \(2015\)](#) are logically inconsistent. I close with a brief discussion of the implications this has for the opacity of definition and for philosophical methodology more generally.

1 Introduction

In recent years, the notion of real definition has played a resurgent role across diverse philosophical subfields. That old Socratic question ‘What is justice?’ can be understood as a demand for the definition of justice; the search for an analysis of knowledge is sometimes described as a quest for the definition of knowledge; physicalism may reasonably be interpreted as the claim that everything is defined in purely physical terms. On this conception, the answers to some of the big questions that philosophy poses—questions ranging from the nature of moral responsibility to the relation between minds and brains—are definitions. In these kinds of cases, it appears that the object of definition is not something representational—like a word or concept. Rather, it is worldly—perhaps a property or a state.¹

In no field is the significance of definition more manifest than metaphysics. In metaphysics alone definition plays not only an external role in characterizing enquiry, but also an internal role as serving as an object of investigation. At its most ambitious, metaphysics promises a definition of definition: a reductive theory of what definition itself consists of. There is currently no consensus on what a final theory of definition is, or even what one ought to accomplish. However, it is reasonable to expect a final theory to be accompanied

¹The term ‘nominal definition’ is sometimes employed to refer to the definition of words. Some dispute the distinction between nominal and real definition. For the purposes of this paper, I assume that the distinction is coherent, and restrict my use of the term ‘definition’ to refer to real definition unless otherwise specified.

by a logic of definition: a way to deduce some definitions from others. With such a logic in place, philosophers could potentially infer many definitions from a few, widely expanding our philosophical knowledge.

This paper investigates this logic of definition. In particular, it addresses a tension between two conflicting (putative) attributes. The first is *definitional substitution*. Some maintain that definitions are substitutable.² For example, if water is defined in terms of its atomic constituents, and its atomic constituents are defined in terms of their subatomic parts, it is reasonable to maintain that water is ultimately defined in terms of its subatomic parts. Within the definition of water, the thought goes, water's atomic constituents can be substituted for their own definition.

Presumably, this is not peculiar to water. If it holds at all, then it holds generally. Whenever one entity is defined in terms of another, the latter may be replaced with its own definition within the definition of the former. So, if the property of *being a bachelor* is, by definition, the property of *being an unmarried male* and the property *being unmarried* is, by definition, the property of *lacking a marriage*, then the property of *being a bachelor* is, by definition, the property of *being a male who lacks a marriage*. And if {2} is, by definition, the set containing only the number 2 and the number 2 is, by definition, the successor to the number 1, then {2} is, by definition, the set containing only the successor to the number 1.

A substitution principle is no idle tool; it may well perform substantial theoretical work. For example, if a physicalist were to demonstrate that biological properties are purely defined in terms of chemical properties and that chemical properties are purely defined in terms of physical properties, she might employ a substitution principle to conclude that biological properties are defined in terms of physical properties.³ Substitution may thus be brought to the aid of the physicalist. Conversely, if substitution principles fail, then demonstrating that all biological properties are chemically defined and that all chemical properties are physically defined would not guarantee that biological properties are physically defined. Something more would be required.

I maintain that definition does not admit of substitution. I do not claim that there are no cases when substitution succeeds. Rather, I claim that substitution conflicts with another logical attribute of definition: *irreflexivity*. As I will argue, even modest substitution principles entail that there are reflexive definitions—cases in which something is defined directly and exclusively in terms of itself. I reject reflexive definitions, and suspect that I am in good company in doing so.⁴ Strange as the literature on personal identity may be, it has never been suggested that Socrates's definition is Socrates himself. And while some

²Metaphysicians present their positions in differing theoretical frameworks, but those who can reasonably be read to endorse definitional substitution include, e.g., Rosen (2015); Dorr (2016). Those who endorse the related phenomenon of transitivity in this area include, e.g., Fine (2015); Correia (2017); Horvath (2018).

³For a philosopher who discusses substitution in this sort of context, see, e.g., Fodor (1974).

⁴Those who can reasonably be read to endorse definitional irreflexivity include, e.g., Rosen (2015); Correia (2013, 2017); Fine (1995, 2015); Horvath (2018). Those who endorse the related phenomenon of asymmetry include, e.g., Wildman (2017).

argue that knowledge is primitive, I know of no one who suggests that knowledge is, by definition, knowledge. However, I have no new argument against reflexive definitions at present, so all that I take myself to demonstrate is a conditional: *if* definition admits of substitution, *then* there are reflexive definitions (alternatively, that *either* definition does not admit of substitution, *or* there are reflexive definitions). I am personally more averse to reflexive definitions than wed to substitution principles, so I take this to constitute a reason to abandon substitution principles. Those who do not object to reflexive definitions, however, may retain substitution principles.

For one principle, this may be unsurprising. Suppose that, without yet taking a stand on what definition consists of, we were to license the following kind of inference:

$$\begin{array}{l} \text{i) } A \text{ is, by definition, } B \\ \text{ii) } C \text{ is, by definition, } D \\ \hline \text{iii) } (A \text{ is, by definition, } B)^{C/D} \end{array}$$

If *A* is, by definition, *B* and *C* is, by definition, *D*, then any replacement of *C* with *D* within '*A* is, by definition, *B*' is valid. This principle straightforwardly accommodates the examples given above.⁵ If we let sentence i) be '{2} is, by definition, the set containing only the number 2' and sentence ii) be 'The number 2 is, by definition, the successor to the number 1,' the principle licenses the inference to '{2} is, by definition, the set containing only the successor to the number 1.'

However, the principle quickly generates reflexive definitions. In fact, it generates reflexive definitions so quickly that I know of no one who endorses it. Suppose, for example, that the property *being a vixen* is, by definition, the property *being a female fox*. If 'The property *being a vixen* is, by definition, the property *being a female fox*' were both sentences i) and ii), the substitution principle would license the inference to 'The property *being a female fox* is, by definition, the property *being a female fox*'—a reflexive definition. Quite generally, allowing the first two sentences to be identical generates reflexive definitions.

Presumably for this reason, many metaphysicians often appeal to more restricted substitution principles. Reflexivity arose, the thought goes, because the principle licensed substitution within the definiendum—or object of analysis. If the substitution principle were restricted to the definiens—or content of analysis, then reflexivity could be avoided.

It is my aim to demonstrate that this restricted substitution principle *also* gives rise to reflexive definitions; the tension between substitution and irreflexivity remains. I directly address two prominent conceptions of definition. The first, championed by Rosen (2015) is that definition is a relation between properties and structured complexes. For example, it

⁵For some examples, altered phrasing might be needed to preserve grammaticality. I take it that these changes preserve the spirit behind this principle.

may be a relation that holds between the property of *being a father* and the complex of being a male parent. The second, advanced by [Correia \(2017\)](#), is that real definitions are a special type of generalized identity.⁶ For example, the sentence ‘To be even is to be a natural number divisible by 2 without remainder’ may express a definition. I argue that each conception is such that restricted substitution principles engender reflexive definitions; the link between substitution and reflexivity does not turn on which conception of definition we adopt.

I do not canvass everything that might reasonably be called a ‘substitution principle.’ Perhaps some do not give rise to reflexive definitions. Nevertheless, I take it that the principles I discuss are rightly dubbed ‘substitution principles,’ and, I suspect, are what many philosophers have in mind when discussing definitional substitution.

I proceed as follows. In section 2, I present the position that definition is a relation between properties and structured complexes, before arguing that substitution principles give rise to reflexive definitions on this view. En-route, I demonstrate that three central claims in ‘Real Definition’ [Rosen \(2015\)](#) are logically inconsistent. In section 3, I present the position that real definitions are a type of identity, before showing that substitution principles give rise to reflexive definitions on this view. In section 4, I generalize the cases from section 2 and 3 to argue that substitution principles generate reflexive definitions on any account of definition. I conclude in section 5 by briefly discussing the implications this has for the opacity of definition and for philosophical methodology.

2 The Relational Conception

It is natural to suspect a connection between the notion of definition—of the *identity* of a thing, or perhaps of *what* makes it the thing that it is, and the notion of ground—of *why* it is that a proposition, or perhaps a sentence, is true. For if the identity of {Socrates} is determined by both set membership and Socrates, it seems no accident that ‘{Socrates} exists’ is made true by facts concerning set membership and Socrates. And if the notions of definition and ground are so tightly related, it is also natural suspect that one is defined in terms of the other.

As far as I am aware, the first rigorous development of this suspicion occurs in [Rosen \(2015\)](#), who provides a definition of definition in terms of ground. Rosen maintains that definition is a relation that holds between properties (or relations) and structured complexes. He does not provide an account of structured complexes, claiming that they are “built from worldly items in roughly the sense in which a sentence is built from words” (pg. 190). These complexes closely resemble Russellian propositions except for the presence of free variables that correspond to the adicity of the property or relation being defined. For example, if the property of *being a person* is, by definition, *being a*

⁶More precisely, definitions closely resemble identities without the ontological commitments that the terms flanking the identity sign denote. See section 3 for a more detailed discussion of Correia’s proposal.

rational animal, then the definition relation obtains between the property of *being a person* and the complex of *being a rational animal*.⁷

Rosen employs a factive notion of ground within his account. For example, the fact that a ball is both red and round might be grounded in the fact that it is red and the fact that it is round, and the fact that an act is morally right might be grounded in the fact that it maximizes utility. Grounding is often taken to be a primitive, non-causal kind of metaphysical dependence. If fact *A* were to ground fact *B*, we might say that '*B* holds *because A* holds,' or perhaps, '*B* holds *in virtue of A*'s holding.' Although the notion of ground has recently come under fire (see, e.g., Della Rocca (2014); Wilson (2014)), it remains a mainstay of 21st century metaphysics.

Rosen adopts the standard (but not uncontroversial) assumptions that ground is a many-one relation and that it is a strict-partial order; i.e., that it is transitive, irreflexive and asymmetric.⁸ He symbolizes ground with ' \leftarrow ,' so ' $A \leftarrow B$ ' means that the fact that *A* is grounded in the fact that *B*.

The other notational element Rosen employs that surpasses the language of second-order logic is the indexed modal operator \Box_t , where '*t*' is a singular term. This operator first appears in Fine (1995) and is roughly translated as 'it is necessary in virtue of the identity of *t*.' So, for example, ' $\Box_{\text{knowledge}}$ (Knowledge is a mental state)' means that it is necessary in virtue of the identity of knowledge that knowledge is a mental state, and ' $\Box_{\text{Better-than}}$ (*Better-than* is transitive)' means that it is necessary in virtue of the identity of the relation *better-than* that *better-than* is transitive.

Thus armed, Rosen defends the following definition of definition:

$$\text{Def}(F, \phi) \text{ iff } \Box_F \forall x ((Fx \vee \phi x) \rightarrow (Fx \leftarrow \phi x))$$

This states that a property *F* is, by definition, the structured complex ϕ just in case it is necessary in virtue of the identity of *F* that, for any object, if that object is either *F* or ϕ , then it is *F* in virtue of being ϕ (i.e., the fact that that the object is *F* is grounded in the fact that the object is ϕ). For example, the property of *being morally right* is, by definition, maximizing utility just in case it is necessary in virtue of the identity of the property *being morally right* that if an act is either morally right or maximizes utility, then the fact that it maximizes utility grounds the fact that it is morally right. Although Rosen's account is stated biconditionally, he intends to provide a definition of definition. That is to say, definition is a relation that, itself, is defined in terms of the account that he provides.

Notably, this does not require that definitions are (or even entail) identities.⁹ Even if

⁷Problems may already arise. If structured complexes so closely resemble structured propositions, they may inherit any obstacles that structured propositions face. For example, Goodman (2017) has argued that Russell's paradox threatens many conceptions of structured propositions. It may be difficult to characterize the relation of Rosen's account in a consistent manner. To his credit, this is a trouble that Rosen foresees.

⁸For challenges to the many-one conception, see, e.g., Dasgupta (2014). For challenges to transitivity, see, e.g., Schaffer (2012). For challenges to irreflexivity and asymmetry see, e.g., Jenkins (2011).

⁹Technically, of course, everything entails identities in that everything entails that Socrates = Socrates (and related statements). More precisely, Rosen's account does not entail that the definiens is identical to the

the property of *being a mother* is, by definition, the complex being a female parent, the property may be distinct from the complex. If the relevant complexes are not themselves properties or relations, a simple application of Leibniz's law ensures that the definiendum is distinct from its definiens; after all, the definiendum bears the property *being a property or relation*, while the definiens does not. In this way, Rosen's conception of definition is not reductionist. Even if every chemical property were defined in terms of physical properties, it may be that (at least some) chemical properties remain distinct from physical properties.

Rosen explicitly endorses definitional substitution, claiming:

It should be possible to prove a principle that licenses arbitrary definitional expansion: $\text{Def}(F, \phi)$ and $\text{Def}(G, \psi)$, then $\text{Def}(F, \phi^{\psi/G})$ where $\phi^{\psi/G}$ is the result of substituting ψ for G in ϕ ...Any account of real definition should license the substitutions of definiens for definiendum in a ground to yield a further ground. (pg. 201)

So substitution is not only admissible, but ought to be provable. The principle at issue is restricted to the definiens; it is admissible only within the content of analysis, not the object of analysis. For example, if the property of *being a square* is, by definition, *being an equilateral rectangle*, and the property *being a rectangle* is, by definition, *being a polygon with four sides*, Rosen's principle licenses the inference to the claim that the property *being a square* is, by definition, *being an equilateral polygon with four sides*. However, by disallowing definitional substitution within the definiendum, Rosen avoids the inference to 'The property of *being a vixen* is, by definition, the property of *being a vixen*' in the manner previously discussed.

Rosen also maintains that definition is irreflexive, claiming:

The ground-theoretic account of real definition has a number of appealing features...It explains why trivial definitions are excluded. Why are there no cases in which $\text{Def}(F, F)$? Because there are no cases in which $Fa \leftarrow Fa$, i.e., because grounding is irreflexive. (pg. 201)

Both ground and definition are irreflexive, and, the irreflexivity of definition arises from the irreflexivity of ground. So Rosen and I disagree; while he endorses both definitional substitution and irreflexivity, I claim that one of the two must go.

2.1 A Point of Inconsistency

At this juncture, it is worth noting that Rosen's following three commitments are logically inconsistent:

a) Grounding is irreflexive

definiendum.

b) Definition is substitutable

c) $Def(F, \phi)$ iff $\Box_F \forall x ((Fx \vee \phi x) \rightarrow (Fx \leftarrow \phi x))$ (i.e., Rosen's Definition of Definition)

Drawing out the inconsistency quickly becomes technically cumbersome, so I help myself to the following abbreviation:

$$\mu =_{def} \Box_F \forall x ((Fx \vee \phi x) \rightarrow (Fx \leftarrow \phi x))$$

μ is merely shorthand for the content of Rosen's definition of definition. Nothing substantive turns on this shorthand; the inconsistency could straightforwardly be articulated without it. Nevertheless, it would be technically unwieldy, so I help myself to the abbreviation. Rosen's definition of definition thus becomes:

$$Def(F, \phi) \text{ iff } \mu \tag{1}$$

Property F is, by definition, ϕ just in case μ . Applying Rosen's account to itself (i.e., taking definition itself to be a relation subject to definition) yields the following result:

$$Def(Def, \mu) \text{ iff } \Box_{Def} \forall \langle F, \phi \rangle ((Def(F, \phi) \vee \mu) \rightarrow (Def(F, \phi) \leftarrow \mu)) \tag{2}$$

That is to say, the definition relation is defined in terms of μ just in case it is necessary in virtue of the identity of the definition relation that, for all F and ϕ , if either F is defined in terms of ϕ or μ , then the fact that F is by definition ϕ is grounded in the fact that μ . This results simply from applying Rosen's account to itself; from taking it to be a definition—rather than merely a necessary and sufficient condition—of definition. The substitution principle and (1) license the substitution of occurrences of ' $Def(F, \phi)$ ' with ' μ ' in the definiens of equation (2). One such application results in:

$$Def(Def, \mu) \text{ iff } \Box_{Def} \forall \langle F, \phi \rangle ((Def(F, \phi) \vee \mu) \rightarrow (\mu \leftarrow \mu)) \tag{3}$$

Equation 3 contains a reflexive grounding relation: $\mu \leftarrow \mu$. Therefore, there is at least one reflexive grounding relation: the fact that μ grounds the fact that μ . So Rosen's definition of definition and his substitution principle collectively contradict the claim that there are no reflexive grounding relations.

A contradiction thus arose from assumptions a), b) and c). Because Rosen is committed to all such claims, his commitments are inconsistent. In order to retain his account, he must either abandon the substitution of definition or the irreflexivity of ground.

2.2 The Conflict Between Substitution and Irreflexivity

Troubling as this inconsistency may be, the current subject is the irreflexivity of definition, rather than ground. Rosen crucially relies upon the irreflexivity of ground in arguing that his account of definition is irreflexive; if he were to abandon the irreflexivity of ground in order to resolve the inconsistency, there would be no guarantee that definition is irreflexive. But is there more? Is it possible to demonstrate that substitution engenders reflexive definitions, rather than just reflexive grounding relations, on Rosen's account?

Employing the substitution principle twice more to equation (3) yields the following:

$$\text{Def}(\text{Def}, \mu) \text{ iff } \Box_{\mu} \forall \langle F, \phi \rangle ((\mu \vee \mu) \rightarrow (\mu \leftarrow \mu)) \quad (4)$$

It is necessary in virtue of the identity of μ that, for all ordered pairs $\langle F, \phi \rangle$, if either μ or μ , then the fact that μ is grounded in the fact that μ . This, of course, is what is required for μ to be defined in terms of itself on Rosen's account, i.e., the following holds:

$$\text{Def}(\mu, \mu) \text{ iff } \Box_{\mu} \forall \langle F, \phi \rangle ((\mu \vee \mu) \rightarrow (\mu \leftarrow \mu)) \quad (5)$$

And, from (4), (5), and the transitivity of the classical biconditional, we obtain:

$$\text{Def}(\text{Def}, \mu) \text{ iff } \text{Def}(\mu, \mu) \quad (6)$$

Real definition is defined in terms of μ just in case μ is defined directly and exclusively in terms of itself.¹⁰ And so, the relational conception of definition results in an inconsistency between substitution and irreflexivity principles.

3 The Generalized Identity Conception

Perhaps some suspect that the tension between substitution and irreflexivity is peculiar to Rosen's account. After all, philosophers have objected for independent reasons. [Correia \(2017\)](#), for example, objects on the grounds that Rosen's proposal fails to guarantee that a definiendum is identical to its definiens. Perhaps a more plausible conception of definition could retain both substitution and irreflexivity principles.

To that end, let us set Rosen's account aside and consider a prominent alternative. Recently, there has been interest in a type of sentence dubbed a 'generalized identity.' These are sentences of the form 'To be F is to be G ', where the 'is' strongly resembles

¹⁰Given that Rosen is also committed to the claim that there are no reflexive definitions, this is another point of inconsistency.

the ‘is’ of identity.¹¹ Notable examples include ‘To be a bachelor is to be an unmarried male’ and ‘To be just is to be such that each part of one’s soul does its own proper work.’ Given that the ‘is’ of these sentences so closely resembles the ‘is’ of identity, it is tempting to suggest that generalized identities state the identities of properties and relations; ‘To be *F* is to be *G*’ is true just in case the property of *being F* is identical to the property of *being G*. However, several philosophers object to this interpretation.¹² Minimally, there is linguistic evidence that ‘To be *F*’ is not synonymous with ‘To be the property of *being F*’ in at least some contexts. The sentence ‘I hope to be an accomplished philosopher’ is perfectly true, yet ‘I hope to be the property of being an accomplished philosopher’ is presumably false—I do not hope to be a property. In addition, some desire accounts of generalized identities to be compatible with nominalism: the contention that abstract objects like properties and relations do not exist. If ‘To be *F* is to be *G*’ were synonymous with ‘To be the property of being *F* is identical to be the property of being *G*,’ nominalists would lack the resources to avail themselves of generalized identities from the outset. For these reasons, some argue that generalized identities strongly resemble, but are not strictly, identity claims.

Notwithstanding these refinements, generalized identities are standardly taken to share the logical and modal profile of identity. In particular, they are transitive, reflexive and symmetric, and if ‘To be *F* is to be *G*’ is true then it is necessarily true, and necessary that all and only *F*s are *G*s. Given that generalized identities are symmetric, it appears that definitions (which are often taken to be asymmetric) cannot immediately be identified with the generalized identities. If to be a square is—by definition—to be an equilateral rectangle, then to be an equilateral rectangle is not—by definition—to be a square.

Correia (2017) argues that definitions are kind of generalized identity. They are generalized identities that satisfy a further requirement, so the set of definitions is a subset of the set of generalized identities. Correia proposes winnowing down the generalized identities into those that are definitions in two ways—one which employs the notion of grounding and the other which employs Lewis’s notion of relative naturalness. The relation between these potential refinements is important in its own right, but does not impact the issue of substitution. For the purpose of this paper, I will restrict my attention to his characterization in terms of grounding. Correia’s notion of ground differs slightly from Rosen’s. In particular, he does not operate with a factive notion of ground—the kinds of things that can stand in grounding relations are generics (like *being F* and *being G*) rather than facts.¹³ With this notion of ground in hand, Correia advances the following account:

To be *F* is_{df} to be *G* if and only if:

- 1) To be *F* is_{id} to be *G*.¹⁴

¹¹See, e.g., Dorr (2016); Rayo (2013); Linnebo (2014).

¹²See, e.g., Dorr (2016).

¹³More precisely, they are *representations* of generics, but this further refinement is not needed here.

¹⁴Following Correia, I distinguish the reading of ‘To be *F* is to be *G*’ that resembles an identity from the

2) Being G grounds being F .

Let us say that, on this account, a sentence *expresses a reflexive definition* just in case it both expresses a definition and the terms for F and G are identical, i.e., just in case there is an instance of ‘To be F is to be F ’ that satisfies both conditions 1 and 2. If ‘to be morally right is to be morally right’ expresses a definition, then it expresses a reflexive definition. A constraint against definitional reflexivity, then, amounts to the claim that no sentences express reflexive definitions.

3.1 The Conflict Between Substitution and Irreflexivity

Correia does not license substitution as explicitly as Rosen does (although, because he takes conditions 1 and 2 to both be transitive, he is committed to the transitivity of definition). No matter—this paper is not a hit piece. Those who accept this account would do well to avoid substitution principles, as they conflict with the commitment to irreflexivity (a commitment Correia explicitly, and repeatedly, makes).

As with Rosen, let us consider a substitution principle that is restricted to the definiens: If to be F is_{df} to be G and to be H is_{df} to be I , then to be F is_{df} to be $G^{I/H}$. For example, if ‘To be hydrogen is_{df} to be the element containing exactly one proton’ and ‘To be a proton is_{df} to be a particle consisting of two up quarks and one down quark,’ this principle entails ‘To be hydrogen is_{df} to be the element containing exactly one particle consisting of two up quarks and one down quark.’

As with Rosen, I help myself to an abbreviation to alleviate excessive formalism:

$$\omega =_{def} \text{to be } F \text{ is}_{id} \text{ to be } G \wedge \text{Being } G \text{ grounds being } F$$

ω is shorthand for the conjunction of the content of Correia’s account. Like Rosen, Correia takes himself to be provided a definition of definition; the definition relation itself is one of the things which could be defined. His proposal thus becomes:

$$\text{To be definition is}_{df} \text{ to be } \omega \tag{7}$$

Given the specifics of his account, this requires:

$$\text{To be definition is}_{df} \text{ to be } \omega \text{ iff to be definition is}_{id} \text{ to be } \omega \wedge \text{being } \omega \text{ grounds being definition.} \tag{8}$$

reading that resembles a definition with the subscripts ‘*id*’ and ‘*df*’. ‘To be F is_{id} to be G ’ is to be read nearly synonymously with ‘Being F is identical to being G ,’ while ‘To be F is_{df} to be G ’ is to be read as ‘To be F is—by definition—to be G .’

The substitution principle and (7) license substituting occurrences of ‘definition’ with ω in the definiens of sentence (8). An application of this results in:

To be definition is_{df} to be ω iff to be definition is_{id} to be $\omega \wedge$ being ω grounds being ω . (9)

As with Rosen’s account, Correia’s proposal generates a reflexive grounding relation under the assumption definition is substitutable—being ω grounds being ω . Another application of the substitution principle results in:¹⁵

To be definition is_{df} to be ω iff to be ω is_{id} to be $\omega \wedge$ being ω grounds being ω . (10)

This is what is required for ω to be defined in terms of itself, i.e.,

To be ω is_{df} to be ω iff to be ω is_{id} to be $\omega \wedge$ being ω grounds being ω . (11)

From 10, 11 and the transitivity of the classical biconditional, we obtain:

To be definition is_{df} to be ω iff to be ω is_{df} to be ω . (12)

Definition is defined in terms of ω just in case ω is defined directly and exclusively in terms of itself. The substitution principle thus gives rise to reflexive definition on Correia’s account. Of course, as previously mentioned, Correia may not support the substitution principle that I put forward. But those who accept Correia’s account would do well to disavow substitution principles; as with Rosen’s account, these principles give rise to reflexive to reflexive definitions.

4 The Universal Link

On both Rosen’s and Correia’s conception of definition, substitution principles are incompatible with irreflexivity. Even substitution principles that are restricted to the definiens generate reflexive definitions. But is this peculiar to these two proposals, or is it a more general phenomenon?

I suspect that it holds generally—regardless of which notion of definition we adopt. The first indication of this is, of course, the fact that both Rosen and Correia’s proposal had this result. This would be a surprising coincidence if the link between substitution and

¹⁵Although the substitution principle licenses this, it is not strictly necessary for the derivation of (10) from (9). Given that generalized identities are reflexive, we already had that to be ω is_{id} to be ω , which is the only difference between (9) and (10). However, the principle was needed to derive (9) from (8).

reflexivity were sensitive to the details of their particular accounts. The second indication is that technical abbreviations were possible. We could derive reflexive definitions while encapsulating the content of each proposal in a single character—omitting any details of the account. That we could derive reflexive definitions while ignoring the details indicates that the details are not responsible for the derivation.

The general connection between substitution and reflexivity can be demonstrated more directly. Select an arbitrary account of definition—one on which the definition relation is itself defined. Let us denote the content of this account, whatever it may be, with τ . Because this is a definition of definition, the definiens of such an account asserts that definition stands in some relation or other to τ . A substitution principle will thus allow replacing ‘definition’ with ‘ τ ’ within a definiens (but not a definiendum). This principle can be employed to demonstrate that the relation that definition stands in to τ is also the relation that τ stands to itself. Because standing in this relation suffices for definition to be defined in terms of τ , it also suffices for τ to be defined in terms of τ . Therefore, a substitution principle will entail that there is at least one reflexive definition—violating an irreflexivity principle.

Notably, reflexivity may not be restricted to this type of case. However, other examples typically depend upon controversial philosophical commitments—other particular definitions that philosophers may accept or reject. Let us suppose, for example, that definitions are a kind of identity and that propositions (those non-linguistic bearers of truth-values) are defined in terms of their logical form.¹⁶ The proposition that grass is green and the sky is blue is, by definition, a conjunction. In particular, it is the conjunction of the proposition that grass is green with the proposition that the sky is blue. The proposition that it is not the case that the Sun revolves around the Earth is, by definition, a negation. In particular, it is the negation of the proposition that the Sun revolves around the Earth. Generally:

$$\begin{aligned} p \wedge q &=_{Def} \wedge(p, q) \\ p \vee q &=_{Def} \vee(p, q) \\ \neg p &=_{Def} \neg(p) \end{aligned}$$

Further, let us assume that there is a proposition that asserts that $p \wedge q$ is defined in terms of its logical form. Let us denote this proposition as $[p \wedge q =_{def} \wedge(p, q)]$, and consider the conjunction of *that* proposition with an arbitrary proposition r . If propositions are defined in terms of their logical form, then this conjunction is itself defined in terms of its logical form, i.e.:

$$p \wedge q =_{Def} \wedge(p, q) \tag{13}$$

¹⁶For an account along these lines, see [Bealer \(1998\)](#).

$$r \wedge [p \wedge q =_{Def} \wedge(p, q)] =_{Def} \wedge (r, [p \wedge q =_{Def} \wedge(p, q)]) \quad (14)$$

Both (13) and (14) obtain if propositions are defined in terms of their logical form. The substitution principle and (13) license the substitution of $p \wedge q$ with $\wedge(p, q)$ in the definiens of (14). This results in:

$$r \wedge [p \wedge q =_{Def} \wedge(p, q)] =_{Def} \wedge (r, [\wedge(p, q) =_{Def} \wedge(p, q)]) \quad (15)$$

Note that the definiens of (15) contains a reflexive definition: $\wedge(p, q) =_{Def} \wedge(p, q)$. If we let r be any true proposition, then the *definiendum* of equation (15) is a proposition which is true. After all, it is the conjunction of two true propositions. Given that, on this conception of definition, the definiens is identical to the definiendum, it follows that the *definiens* in (15) is also a proposition which is true.¹⁷ But the definiens is the result of conjoining r with a proposition that asserts a reflexive definition. In order for this conjunction to be true, the following must be true as well:

$$\wedge(p, q) =_{Def} \wedge(p, q) \quad (16)$$

Because $\wedge(p, q)$ is defined directly and exclusively in terms of itself, there are reflexive definitions. Of course, it is possible to reject the assumptions this example relies upon; perhaps propositions are defined as sets of possible worlds, rather than in terms of their logical forms. However, it may be possible to derive reflexive definitions with substitution principles from cases that do not concern the definition of definition depending on particular philosophical commitments.

5 Conclusion

Restricted substitution principles have been employed in attempt to retain the theoretical benefits of definitional substitution while avoiding the cost of reflexivity. These principles fail to achieve the desired result; reflexive definitions remain. Plausibly, the link between substitution and reflexivity is insensitive to which account of definition we adopt. Rather, it results on every definition of definition.

I close by briefly sketching some of the implications that this has. The first, which was alluded to before, is methodological. Unless philosophers countenance reflexive definitions, they cannot infer from the fact that A is defined in terms of B and the fact that B is defined in terms of C that A is defined in terms of C . For example, if philosophers were

¹⁷I assume that, in order for two positions to be identical, they must share the same truth-value.

to argue that sets are defined in terms of their members and that people are defined in terms of their genetic makeup, they ought not immediately infer that {Socrates} is defined in terms of Socrates' genetic makeup. And if biological properties are defined in terms of chemical properties and chemical properties are defined in terms of physical properties, it does not immediately follow that biological properties are defined in terms of physical properties.

Another implication depends upon additional metaphysical commitments. Fine (1995) has argued that ontological dependence ought to be understood in terms of definitional containment.¹⁸ Somewhat loosely, an entity *A* ontologically depends upon an entity *B* just in case *B* is contained within the definition of *A*. The reason that water ontologically depends upon hydrogen is that hydrogen is contained within the definition of water. On this account, definitional substitution principles may be employed to ensure that ontological dependence is transitive. Because *B* may be substituted with its own definition within the definition of *A*, *A* ontologically depends upon that which *B* ontologically depends upon. Without a substitution principle in place, something else must be employed to demonstrate that ontological dependence is transitive.¹⁹

A third implication is that if definition is irreflexive, then it is *linguistically opaque*. While transparent contexts are ones in which co-referential terms can be substituted *salva veritate*, opaque contexts are ones in which they cannot. Many (presumably most) predicates are transparent. So long as 'Superman' denotes the same person as 'Clark Kent,' one can infer from 'Superman is 6' 3" tall' that 'Clark Kent is 6' 3" tall.' In contrast, 'believe' is a canonical opaque predicate. While 'Lois Lane believes that Clark Kent works for the Daily Planet' may be true, 'Lois Lane believes that Superman works for the Daily Planet' may be false. If there are no reflexive definitions, then 'definition' functions more like 'believes' than 'is 6' 3" tall,' precisely because substitution principles fail.

These are the principle implications that I am confident of. I suspect that they relate to puzzles beyond the scope of this paper. In particular, I believe that the opacity of definition sheds light on the paradox of analysis, which concerning how a definition can be both true and informative if its definiens is identical to its definiendum. A systematic discussion of this implication is worthy of a paper in its own right, so I leave that topic for another time.

¹⁸For objections to Fine's proposal, see, e.g., Koslicki (2012); Wilson (Forthcoming).

¹⁹Or, alternatively, such a philosopher may accept that ontological dependence is intransitive.

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