Two Models of the Subject–Properties Structure

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Abstract

In the paper I discuss the problem of the nature of the relationship between objects and their properties. There are three contexts of the problem: of comparison, of change and of interaction. Philosophical explanations of facts indicated in the three contexts need reference to properties and to a proper understanding of a relationship between them and their bearers. My aim is to get closer to this understanding with the use of some models but previously I present the substantialist theory of object and shortly argue for its main theses. The two models enabling us the understanding of the subject–properties structure are: the plastic stuff model and the functional model. On the ground of the first a subject is compared to a piece of plastic stuff which is informed by different shapes. Properties are ways how a subject is, they “give” some “figure” to a subject. The core idea of the second model is that essences (performing the role of subjects) are immanent functional laws governing correlations of properties. As such they are similar to mathematical functions which are saturated by values. The relationship between a subject and properties can be grasped by analogy to such a saturation.

Keywords Subject–properties structure · Essence · Substance · Ontological modeling

1 Introduction

The problem discussed in this paper can be stated in a relatively simple way: What is the nature of the relationship between an object and its properties? An object considered in opposition to properties, as a correlative of properties, is called a “subject”. Thus we will be searching for the proper understanding of the subject–properties structure. My thesis is that we can get closer to a clear understanding of this structure with the use of two models: the plastic stuff model and the functional model.

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In the paper I accept the substantialist doctrine of object¹ according to which an object is a subject modified² by properties. Such a subject is identity-independent of properties although it is existentially conditioned by them.³ Moreover substantialists are convinced that a subject is not bare substratum but is constituted by a basic qualitative characteristic called essence. I will shortly argue that such a constitution is identity.

On the ground of the first model a subject is compared to a piece of plastic stuff which is informed by different shapes. Properties, as analogical to shapes, are ways how a subject is, they “give” some “figure” to a subject. The core idea of the second model is that essences (performing the role of subjects) are immanent functional laws governing correlations of properties. As such they are similar to mathematical functions which are saturated by values. The relationship between a subject and properties can be grasped by analogy to such a saturation.

My aim is *to understand* the relationship in question and not to build any explanatory philosophical doctrine. But, as one can easily notice, the understanding I am looking for is a part of such a doctrine. Thus although I cannot give expanded arguments for all my theses I present very short reasons supporting the most important of them: that properties exist, that the concept of property cannot be identified with the concept of universal, that immanent universals do not exist, that substantialism is better than bundle theories and substratum theories, that we need essences, that essences are specific laws. I hope my lines of reasoning can be easily grasped.

To avoid misunderstandings I should say, in the very beginning, that my concept of property is in some respects different than the concept usually accepted by analytical philosophers. For me, as it is going to turn out, properties are abstract (I mean abstraction by isolation) particulars, so they are not something what objects literally have in common. On the other hand they enjoy very weak ontological status so they are not basic “bricks” of reality. This is why I do not call them “tropes” (see Chrudzimski 2002). My properties are Aristotelian accidents but the latter term suggests that all properties are contingent characteristics of objects what seems to me incorrect. Thus I prefer “properties” especially that this term is used by my philosophical idol: Roman Ingarden.

The substance theory of object which I finally accept in this paper is a sort of modified Aristotelian substantialism. Although I do not believe in some Aristotelian

¹ My concept of substance is a Neoaristotelian one and is quite close to those developed by Jonathan Lowe (2004, 2005, 2006) and Christian Kanzian (2016).

² There are many names signifying a relationship between properties and objects: “characterization”, “accruing to”, “inherence”, “being in”, “exemplification”, “modification”. For reasons which will become clearer in Sect. 9, I prefer the latter term.

³ I am aware of problems concerning the thin/thick substance distinction (see Pasnau 2011, pp. 99–102). A subject is a thin substance, i.e. a substance in abstraction from properties. Objects known from our daily experience are thick substances: subjects modified by properties. Nevertheless in a sense we can identify everyday objects with thin substances because properties are identity-dependent on them. An addition of a new property to a thin substance does not generate a new thin substance. A thick substance is not a whole: “a thin substance+properties” but it is a thin substance *as* modified by properties. Thin substances, although inseparable from properties, are the fundamental objects in the world if we define the fundamentality in terms of identity-independence.

theses, for example that prime matter exists, my view on the basic structure of object is in its deepest core Aristotelian. I am aware that Aristotle and his followers were not the sole philosophers who have been dealing with these problems and I know the tradition of the issues discussed in my paper is very extensive. Yet in this article I would deliberately like to state and analyze these issues from the systematic point of view. Thus historical remarks are almost absent in my paper. Surely, it would be very fruitful to show how prominent philosophers of the past tried to solve these problems but including historical analyses, which would be thorough enough, would substantively disturb my own reasoning. As I said above my main aim is not to give extensive arguments for the substance theory of object but to suggest a relatively new way of understanding this theory. Therefore I only signal some schematic arguments for the substance theory and arguments against its rivals. These alternative theories are presented in the standard versions discussed in the contemporary literature. Nevertheless, it is quite easy to associate them with historical doctrines of British empiricists and their successors who, as we know, were the main opponents of the Aristotelian substance theory.

2 Some Basic Ontological Notions

Following Roman Ingarden (2013, pp. 147–155) I distinguish existential dependence and existential inseparability⁴; this distinction has not been discerned by analytical philosophers⁵ but I think it allows for a more precise description of the ontological status of properties. My definitions of inseparability and dependence are modified Ingarden's formulas and they sound as following:

x is existentially inseparable from *y* iff it is implied by the essence of *x* that (i.) *x* coexist with *y* and (ii.) *x* together with *y* make up a non-mereological whole i.e. a whole united by a formal relationship(s).

x is existentially dependent on *y* iff it is implied by the essence of *x* that (i.) *x* coexist with *y*, and (ii.) *x* and *y* do not make up any non-mereological whole i.e. a whole united by a formal relationship(s).

Ingredients of a non-mereological whole are not its parts in a regular sense, i.e. they are not “pieces” of the whole, but they are its abstract aspects.

Both types of existential conditioning can be symmetric or asymmetric, rigid or generic. Above formulas are definitions of rigid inseparability and dependence, i.e. inseparability from (or dependence on) a particular, determinate entity. Roughly speaking: *x* is generically dependent on entities of a type *F* iff *x* must coexist (in a manner described above) with any entity belonging to *F*. In an analogical way we can define generic inseparability. Neither inseparability nor dependence can obtain

⁴ In Polish: “niesamodzielnosc”; in German: “Seinsunselbständigkeit”. Szylewicz translates it as “non-selfsufficiency”. I decided to use “inseparability” to stress the condition of making up one whole.

⁵ For standard accounts of ontological dependence see Correia (2005), Koslicki (2013), Tahko and Lowe (2016).

on their own. They must be grounded in some formal relationships or regular necessary relations. A formal relationship is such a reference (in the ontological sense of Aristotelian *pros ti*) of one entity to another which is not a relation.⁶ It means that formal relationships are not additional entities existing between objects but are forms of immediate and (rigidly or generically) necessary coexistence of entities. I postulate them (as Roman Ingarden, Jonathan Lowe, Peter Simons, Arda Denkel and many others) to avoid the Bradley regress.

A formal relationship is always necessary (rigidly or generically) for at least one of its arguments. There are also possible regular necessary relations. In a whole made up by inseparable entities formal relationships are principles of the unity—they are “ties that bind” as Simons (2005) calls them. But not all formal relationships are such ties. On the ground of classical theism every creature stands to God in the formal relationship *being created by*, but it is not a relationship generating inseparability. Therefore creatures are only dependent (rigidly and asymmetrically) on God. The same can be said by Platonists about individual things participating in ideas.

I also will use Jonathan Lowe’s concept of identity-dependence in his own formulation (2004, p. 149):

The identity of x depends on the identity of $y =_{\text{df}}$ Necessarily, there is a function F such that it is part of the essence of x that x is the F of y .

This definition is equivalent to another statement by Lowe (2004, p. 147): “To say that the identity of x depends on the identity of y —or, more briefly, that x depends for its identity upon y —is to say that *which* thing of its kind y is fixes (or at least helps to fix) *which* thing of its kind x is. (By ‘fixes’ in this context I mean *metaphysically determines* [...]).” We can also say that x is identity-dependent on y iff the essence of x *contains* a formal relationship to y . In this sense identity-dependent objects have relative essences.

Identity-dependence must be grounded in some formal relationship. Identity-dependence entails existential dependence or inseparability.

Separable entities are entities which are not inseparable. Analogically, independent entities are entities which are not dependent. Separable objects can be dependent or independent. A dependent object is always separable and it can be of two types: either it does not make up any whole with the object on which it is dependent or they both compose a *mereological* whole—united by regular necessary relations (there is at least possible that there exist wholes composed of distinct but mutually dependent subjects-of-properties).

⁶ See Chrudzimski (2005), Lowe (2006), Mulligan (1998).

3 The Problem of Properties: Three Contexts

In both daily life and in scientific practice, we distinguish between objects and their properties. We talk about tomatoes, dogs, people, electrons but also about colors, sizes, abilities, electric charges and so on. Most of human languages reflect this distinction in the subject–predicate structure of proposition. Do we have good reasons for the belief that objects have properties? I think we do although it is not my aim to provide an expanded argumentation for this belief. But it is worth to notice that the distinction between objects and properties is usually made in the following three contexts:

- A. *The comparative context* We ascribe properties to objects when we compare them and find some similarities and dissimilarities. Such resemblances and differences are partial and to explain this fact we postulate properties as entities responsible for this fact. Properties are aspects of objects due to which objects resemble each other or differ from each other. A snooker billiard ball and a pool billiard ball are similar because some of their properties are “the same”⁷: roundness, smoothness, sheen, density and being made of phenol resin. But other properties are different: size, color (or color-pattern), mass and volume.
- B. *The context of change* The fact of change is usually explained in terms of properties. Objects change in the sense they have different properties in different times. Or in other words: they lose and acquire properties. A ripening banana changes because its greenness is replaced by yellowness.
- C. *The context of interaction* If I throw a stone against a window in my room, the window glass will break. It will happen not because the stone is grey, wet, cold and of an irregular shape; rather the window breaks because the stone is hard and heavy. On the other hand, the glass can be broken not because it is smooth and transparent but because it is thin and fragile. Objects are not totally engaged in their interactions with other objects. To explain this partial causal engagement we need properties as aspects of objects responsible for their various actions and reactions.

Properties seem to be necessary for explanations of the facts mentioned in these three contexts. Thus all more elaborated arguments for properties should be based on such facts. We would not need properties if the world would be constituted by a single, perfectly homogenous, immutable entity.

The presented contexts must also be taken into account in doctrines concerning the nature of the relationship between properties and an object. Contemporary philosophers (especially analytical) usually limit their considerations to the first context and sometimes neglect the need for the theory coping with dynamic aspects of the relationship in question. The traditional Aristotelian doctrine of accidents was a response to the problem of change and the Aristotelian theory of potencies was

⁷ I use quotation marks because, as it is going to turn out, I refute the thesis that objects can have literally common properties.

a partial response to the problem of interaction. Yet Aristotelians have not noticed that the context of interaction can illuminate our understanding of the relationship between objects (substances) and properties (accidents) in a way I will try to show in this article.

4 Properties and Essences

Yet there is an additional complication of the story. In our everyday practices we ask two different types of questions concerning objects, both relevant for the ontology of properties (see Ingarden 2016, pp. 85–93). The first type are questions about identity of things,⁸ like “What is it?” or “Who is she?”. If they concern persons, we usually answer them by saying the name of an indicated person (“This is John Smith”). In other cases we simply say “This is a man” or “This is a cat”. Answers of the latter form are ambiguous because they can be misinterpreted as answers to the questions about natural kinds to which objects belong. To avoid ambiguity we should rather say: “This is this man” or “This is this cat”.

On the other hand, we ask questions “What is it like?” or “What is she like?” and answer them: “This is nimble” or “She is wise”. In other words: we distinguish what/who an object is (in the sense: what its identity is) and what an object is like (or how it is). This distinction is associated with the object–properties distinction. An aspect due to which an object is *what it is* is called “essence”. Aspects responsible for *what an object is like (how it is)* are properties.

Why could we not say that an essence is one of object’s properties? It is not merely an issue of terminology. If we agree properties inhere in objects or modify objects then the essence cannot be a property but it is a much more fundamental characteristic which is a necessary condition of having properties. Socrates’ humanity makes him what he is (this man), and Garfield’s felinity makes him what he is (this cat). An essence constitutes an object in a sense it determines its individual identity. Properties only modify objects and do not determine their identities. Socrates’ wisdom makes him what he is like, the same we should say about Garfield’s nimbleness (before he used to eat lasagna in large quantities).

The distinction between essence and properties crosses all the three contexts. We compare objects with respect to what they are and with respect to what they are like (how they are). Differences or similarities concerning essences are considered as much deeper than those concerning properties. An object undergoing change retains its essence but it loses its properties. Finally an essence is considered as the ground of the fundamental potencies (dispositions) of an object. The adequate complete theory of the object–properties relationship cannot neglect the essence–properties distinction but it should provide arguments for or against it.

It is worth to remember that the essence–properties distinction should not be identified with the necessary–unnecessary distinction. The difference between essences

⁸ I do not mean identity through time, nor transworld identity, nor identity in the sense of relation, but something what John Locke called “a thing’s identity”. See Tahko and Lowe (2016, sec. 4.2).

and properties is not modal. Of course an essence is a necessary characteristic of a thing. But almost all traditional essentialists (especially of Aristotelian provenience) believed that some properties are necessary as well. Aristotle himself called them *idia*. Aristotelian scholars used the name *propria* (proper accidents). Christian Wolff distinguished essence and attributes—both were necessary unlike the third type: modes. Necessary properties which do not constitute an essence were also accepted by Roman Ingarden (2016, pp. 350–355), Jonathan Lowe (2013) and David Oderberg (2011). Necessary properties are existentially conditioned only by an essence while accidental properties are conditioned by an essence and external circumstances. As Thomas Aquinas used to say: proper accidents are naturally implied by an essence or “emanate” from an essence. Analogically, necessary relations I mentioned above, are determined only by essences of the relata.

5 Properties and (Immanent) Universals

In analytical philosophy the problem of properties is usually identified with the problem of universals. Moreover the concept of property is identified with the concept of universal in the sense of “universal” settled by moderate realists.⁹ According to this doctrine universals are immanent characteristics of things *literally* shared by them: a redness of a tomato in my basket is numerically identical to a redness of a slice of tomato at your sandwich.

This (in my opinion invalid) identification of the concept of property with the concept of universal results from the unjustified limitation of the problem of properties to the comparative context specifically conceived. In this context the problem of so-called attribute agreement arises when one stresses similarity of things and searches for its ontological ground. Then properties are postulated as aspects of objects grounding the attribute agreement in a special way: by the fact that they are wholly present in many things. This is how a peculiar concept of property arises—a concept combining two affairs: (i) being an aspect that can be distinguished within a thing and (ii) being wholly present in many things. Therefore philosophers who accept such a concept of property and refute universals (entities which are wholly present in the many) must also refute properties (aspects distinguished in a thing) and claim that things are undifferentiated blobs. The qualitative equipment of objects is stolen (by austere nominalists) or exported to sets (by class nominalists).

But as trope theorists show it is possible to postulate properties (aspects of things) and to refute immanent universals. Then properties are particulars as well. We can still compare things in terms of properties and explain resemblances and differences between them by perfect resemblance between things’ particular properties. The latter resemblance can be considered as a primitive fact. Anyway the possibility of trope nominalism shows that the problem of properties is not the same as the problem of universals although the two problems are only relatively independent.

⁹ Most of papers having “properties” in titles are about the problem of universals. See, for example, Oliver (1996).

The same conclusion can be drawn if we take into account all three contexts of the problem of properties.

In this paper I assume that the world of physical and psychophysical objects existing in time is entirely particular. But I do not want to resolve the dispute over universals although I refute moderate realism described above and all positions according to which objects are quality-less blobs. I also believe that Platonism is a momentous option in the debate and does not have to be interpreted as a hidden nominalism. Yet at this place I can only signal the main line of argumentation against literally sharable properties (and essences). My argument is a modified version of the Plato's separation argument from *Parmenides*.

If two objects literally would share a property (or an essence) they would be rigidly inseparable from themselves or a property (essence) in question would be separable of itself. Both possibilities are unacceptable. We can see that a red tomato is separable from a red apple. On the other hand nothing can be separable of itself because it would mean that such an object can exist without making up one non-mereological whole with itself. If a property would modify many separable objects, it would lack unity. This version of the argument is not based on a spatial understanding of separation. It can be applied to non-spatial entities as well. Spatial versions of the argument can be challenged because properties and essences (even conceived as particulars) are not spatial beings in the same sense as concrete objects are.¹⁰ Since for me separation is just existential separability and I do not define it in spatial terms, my argument cannot be challenged this way. Of course I presuppose that properties are rigidly inseparable from objects, that inseparability is transitive and that every entity is rigidly inseparable from itself. I am aware that my argument can be objected at least with respect to these three points but in the present article I cannot develop proper counterarguments.

Hence I use a very narrow concept of property: it is a particular (in the sense: neither sharable nor instantiable) aspect of a thing which makes a thing what it is like (how it is). Particularity does not mean qualitative uniqueness for me, so things can have perfectly similar (but not identical) properties (and essences¹¹).

6 Three Standard Views

In the history of philosophy we can find three main lines of thinking about the nature of the relationship between an object and its properties. These lines are exhibited in three types of theories of object: bundle theories, substratum theories and substance theories.¹²

¹⁰ See Loux (2006, pp. 19–21).

¹¹ I refute the identity of indiscernibles principle so I do not need the notion of primitive thisness. Essences are not composed of qualitative content (for example, humanity) and primitive thisness.

¹² See, for example, Loux (2006, ch. 3), Macdonald (2005, ch. 3).

Bundle theorists¹³ think properties are parts of objects so the relationship in question is the part-whole relationship. In the simple bundle views objects are nothing over and above properties but they are just pluralities of properties. Obviously there is no distinction between essence and properties here, or better: all properties constitute an essence of an object. In the result an object cannot lose any property. Objects do not change but they are replaced by other objects (other bundles). Simple bundle theories have some explanatory power in the comparative context but they do not cope with the context of change. Another problem is that a bundle is conceived as united by a relation called co-presence or consubstantiation. Such a relation is an additional component of a bundle so it needs to be united with other components. Thus we need a higher order co-presence or consubstantiation. The operation must be iterated into infinity and we land in a vicious regress.

Some bundle theorists provide sophisticated versions of the theory supposed to cope with the aforementioned problems.¹⁴ Simons (1994) distinguishes a nucleus of a bundle and a halo surrounding it. Properties (tropes—Simons is a nominalist) within a nucleus are rigidly mutually inseparable, nucleus is generically inseparable from properties constituting a halo, and the latter are rigidly inseparable from a nucleus. Thus a bundle can lose and acquire properties. Moreover a bundle is united by “non-relational ties that bind”, so the Bradley regress is avoided.

According to substratum theories¹⁵ an object is composed of properties and a bare substratum in which they inhere. The principal motivation for this theory is associated with the belief that properties are universals. Then two bundles composed of the same universal properties would be indistinguishable and (given the principle of identity of indiscernibles) identical. Bare substratum is postulated in this context as a principle of individuation and is called a bare particular. Since properties are universals and the substratum is particular the latter must be bare in the sense it is propertyless, which can be understood in two ways. First, that a substratum can exist without any properties (is separable from properties). Second, that a substratum is inseparable from properties but as considered in abstraction of them has no qualitative content on its own. Such substratum resembles Aristotelian prime matter.

In the entirely particular world such a motivation for substrata is completely irrelevant. But a friend of particular properties can invite substrata to his ontology as correlatives of properties. If a property's essential function is to modify something, substrata can be seen as good candidates for entities to be modified. It is important especially in the context of change, when we need something which is modified by new properties. Substrata can also, supposedly, serve as principles of unity: a substratum is a core around which properties are united. Yet there is a problem with the “breeness” of substrata. As bare they do not contain any reason to be modified by such and such properties, so it not clear why they are principles of unity (and why

¹³ Usually George Berkeley and David Hume are considered the fathers of bundle theory but probably the theory in germ can be found already in Plato.

¹⁴ See Keinanen (2005) and Denkel (1996).

¹⁵ In the modern philosophy this is John Locke who is considered a paradigmatic substratum theorist. However, Locke's theory of object was much more complicated. See Martin (1980).

they are inseparable, if you accept the second version of the theory). In this role they can be replaced by some proper formal relationship, what directly leads to a bundle theory.¹⁶

Substrata considered in themselves can acquire any property. Only the presence of other properties prevents them to do so. Bare substratum can survive any change—like prime matter. It cannot serve as the reason of the order of changes which an object undergoes. Finally substrata as devoid of any immediate own qualitative endowment cannot be sources of actions and reactions of objects. The burden of responsibility for explanation of facts within the three contexts rests on properties. The sole role of a substratum is being an empty subject of properties, the second term of the inherence relationship.

But one can say that objects themselves are such subjects and we do not need substrata.¹⁷ When one says that John is a subject of his wisdom, one does not mean any hidden substratum but John himself. Sometimes such a theory of object is presented as an alternative for the previous two but I think it is a version of a sophisticated bundle theory. For if we abstract (still in the sense of abstraction by isolation) from all properties of such object, nothing is left. One can insist that an object is ontologically prior to properties because properties cannot exist outside an object. It is true but notice that they cannot do so not because they are inseparable from an object but because they are inseparable from other properties. An object is merely the result of the fact that all properties “supply” each other. Still an object is nothing over and above properties although it is not a mereological composition of them. This is why Simons’ doctrine is still a bundle theory and not a hidden substantialism.

The problem of the relationship between an object and its properties is in some essential respects similar to the one-many problem: How can we reconcile the unity of an object with the plurality of its properties? Since the one-many problem is entangled in the problem of identity the question can be reformulated as: How is an identity of *one* object related to *many* identities of properties? Given that a thing’s identity is determined by a thing’s essence, we can ask: How is an essence of an object related to essences of properties?

Bundle theorists should think that an object is just a plurality of properties even if properties are inseparable from each other. But if an object is something over and above properties its identity cannot be determined by properties. I maintain, following Scaltsas (1994, pp. 65–69, 150–154; 2015), that such a situation is impossible unless there is something beside properties—something which has primitive identity and on which properties are identity-dependent. The entity in question is a subject of properties; it is not a bare substratum but it must “have” (in a sense) its own qualitative content called essence. Otherwise a subject could not be a proper principle of unification and could survive all changes also. An essence determines types of properties a subject must (rigidly or generically) coexist with.

But what is the relationship between essence and a subject? Notice that a subject must be identity-independent of anything which can be found in an object. The

¹⁶ See Benovsky (2008).

¹⁷ See, for example, Heil (2003, pp. 171–173).

same should be said about an essence, if it determines the individual identity of such object. But they cannot be two distinct entities because we would have the one-many problem again. Thus a subject is an essence.¹⁸ Strictly speaking: an essence performs a function of being a subject of properties, or in other words: a subject in abstraction from all properties is identical to an essence.¹⁹

A subject, as identical to an essence, can be a principle determining types and a range of properties from which it is rigidly or generically inseparable. Thus a subject is also the ground of order of changes it undergoes and the ultimate ground of its own actions and reactions. This way we have reached at the substance theory of object. According to this view an object is a subject constituted (identical to) by an essence and modified by properties. John is “this human” modified by a certain height, mass, size, volume, temperature, color, abilities, intellectual powers, volitional powers etc.

The substance theory of object is the richest theory which can cope with all nuances of the three problem contexts and does not neglect the difference between an essence and properties.

7 The Ontological Status of a Subject and of Properties

According to the substance theory both: a subject and properties are mutually ontologically conditioned. But these ways of conditioning are differentiated:

- (i.) All properties are identity-dependent on a subject but a subject is identity-independent of properties.
- (ii.) All properties are rigidly inseparable from a subject.
- (iii.) A subject is rigidly inseparable from some properties—called necessary or essential properties—and generically dependent on some other properties—called accidental properties.
- (iv.) Essential properties are implied (non-causally) only by an essence of object.
- (v.) Accidental properties are partially implied (non-causally) by an essence and partially causally determined by external circumstances.
- (vi.) Some accidental properties are determined by external circumstances only with respect to the beginning of existence—they are called “acquired properties” (e.g. a shape of a marble statue or having a scar).
- (vii.) Other accidental properties, called “externally conditioned” are causally determined by external circumstances in respect of the beginning of their existence and in respect of their further persistence; thus they are inseparable from a

¹⁸ See also Scaltsas (1994, pp. 128–142).

¹⁹ More traditional Aristotelians usually believe that a subject (essence) is a composition of prime matter and a substantial form. I refute prime matter; so for me a subject, an essence and a substantial form are identical if we consider them in abstraction from properties.

subject and dependent on the external world (e.g. a shape of a portion of water poured into a glass).²⁰

Although a subject (essence) is mutually rigidly inseparable from essential properties, it is not identity-dependent on them. The formal relationship “being a subject” is not a part of an essence. Moreover it is not an additional formal relationship at all. An essence is a subject of properties because *they* perform the function of modification with respect to an essence. This function belongs to the nature of every property so they are identity-dependent on a subject. Modification is an asymmetrical relationship and arguments of this relationships are called accordingly: “subject” and “properties” because they stand at “different ends” of this relationship. But only a nature of each property contains a relationship of modification. An essence of identity-independent object (substance) does not contain any formal relationships although such an essence stands in some such relationships. Subjects are ontologically prior over properties because subjects are identity-independent of properties while properties are identity-dependent on subjects. Mere existential conditioning is not enough to express such priority. The ontological inequality of a subject and properties, based on asymmetry of identity-dependence can be also illustrated by the fact that we are apt to say that an object *is* a subject modified by properties but it seems odd to say that an object *is* properties modifying a subject.

But do we really need both: essences and essential properties? Why cannot essences be reduced to a bundle of essential properties? Beside the line of reasoning sketched above (concerning the problem of reconciliation of unity and plurality) we can use such an argument:

Let us start with an example. In the case of a human being an essence is humanity and essential properties are among others: intellect, will, sensual powers and vegetative powers. Yet we can also find beings which have some of these powers without having others: plants have vegetative powers but are devoid of senses, will and intellect. Animals have both: vegetative and sensual powers but do not possess the ability of purely conceptual reasoning and are unable to make moral decisions (let us assume so). Medieval scholars believed in pure spirits which had intellect and will but did not have vegetative and sensual powers (assume such beings are possible). It seems that these powers considered in themselves do not need each other—they do not have to be co-exemplified in one being. So why are they inseparable from each other in one particular object, for example in one particular man? Obviously because they are inseparable from something else: a subject. But notice that such a subject cannot be bare, because then there would be no reason for joint co-exemplification of essential properties. Thus a subject must have its own qualitative content which is inseparable of all essential properties. An essence has such qualitative character which enables it to be a principle of co-exemplification of essential properties. Aquinas’ “emanation” of *propria* from essence can be explained in terms of inseparability grounded in qualitative character of essence and essential properties. Roman

²⁰ See Ingarden (2016, pp. 345–350).

Ingarden holds another statement: that the essence is equivalent to essential properties, in the sense: such properties are “balanced” by the essence.

8 The Need for Models

All aforementioned conditionings between a subject and properties are implied by the formal relationship called modification. But modification cannot be reduced to those dependencies (in a broader sense of the word). We know how a subject is conditioned by properties but we still do not know what properties exactly “do” with a subject. What does it mean properties modify it a subject?

It is easier to say what properties do not “do” with a subject but this knowledge is a trivial consequence of that what was said about differences between properties and essences. Properties, even necessary, do not make essential differences. Thus a happy man is not a kind of man as a rational animal is a kind of animal. It is trivial because it means only that modification is not a constitution. Properties modify essence (as a subject), so they somehow “change” it but despite this “change” the essence is still the same.

On the ground of the substance theory modification is a primitive relationship. Such primitives can be found in all explanatory theories and it is not any problem—explanations still work despite of or rather: due to some primitive notions. Troubles arise when we want to understand such notions, especially: primitive relationships. All attempts to understand them seem to be circular then. The three concepts: of subject, of property and of modification are essentially interrelated. We do not have any direct insight into modification. In sense perception we grasp modified subjects of properties but we do not perceive subjects nor properties themselves, nor the relationship between them. Unlike some phenomenologists, I think we do not have any eidetic vision of the relationship in question. This is why we need models. I would like to emphasize that we need them only for understanding not for explanatory purposes.

Models are usually introduced if the thing to be represented by a model cannot be directly perceived or adequately imagined or conceived. It especially concerns relations between entities constituting the thing in question. In the model we use more familiar relations which only partially and inadequately represent less known relations. We should be careful using models and must remember about their constraints. A model is only a sort of leading idea which facilitates our thinking about the represented object but is not a concept of this object.

9 The Context of Change and the Plastic Stuff Model

Notice that in fact bundle theories can be considered (*pace* their adherents) as examples of ontological modeling: the subject–properties relationship is represented by the whole-parts structure—much more familiar to us. This model works to some extent i.e. it can explain the function of properties as similarity-makers and difference-makers but as I mentioned it fails in other respects. Thus, if we limit our

investigations only to the context of comparison and neglect the essence-property distinction, we may find bundle theories (models) adequate. As I signaled above: the explanation of other contexts requires the substance theory. Yet to understand this theory, we need more sophisticated models of the subject-properties structure.

Let us start with the context of change. Substantialists insist that change cannot be reduced to a mere succession of bundles of properties (or states of affairs, events and so on) because then there is nothing which really undergoes changes and endures through changes and despite changes. Thus, we need a subject which loses and gains properties in some order. One of the objections against the doctrine so outlined is that it does not meet its own requirements. For a subject in question seems to be unchanging if it remains the same through changes. The objection can be weakened by the distinction of two meanings of change. First, “change” means “replacement”. In this sense properties change because they are replaced by other properties, and a subject does not change because it is not replaced by another subject. The second meaning of “change” is “new modification”. In this sense a subject changes because it is modified by new properties.

If a change in the second meaning is to be real, modification should be considered as a sort of transformation. But then a property should be conceived as an accidental form of a subject, a mode in which it exists. Properties give some “figure” to a subject, some “shape”. A subject cannot exist as formless. Socrates cannot be “this human” as such, without other qualifications. He must be “this human” existing in certain forms: as a wise, corpulent and healthy human. Wisdom, corpulence and health are ways how Socrates (“this human”) exists, they are forms in which Socrates is embodied. It should be remembered that for scholastics accidents (properties) were accidental *forms*. The substantial subject was conceived as informed by accidents. Within this framework a subject is in potency with respect to properties and the latter are acts. It means a subject receives properties and is perfected by them while properties are perfections which transform a subject.

Thus, the relationship between a subject and properties is much closer and intimate than it is sometimes supposed to be. Properties are immanent characteristics of a subject although they do not constitute it. This immanence is very peculiar and shows how weak the ontological status of properties is.²¹ Consider a steel hardened bar. It has a property of *being hard*. Is this property hard? Of course not—the bar itself is hard. This fact seems to be trivial but, as many seemingly trivial facts, is ontologically important. Properties are not additional beings glued in some way to a subject—even if that glue causes inseparability. No property retains its qualitative (or quantitative) content (like hardness, wisdom, redness, extension etc.)²² for itself. Every property transfers its quality to a subject. Properties do not cover a subject. They are not like labels on the bottle. They are merely ways of subject’s

²¹ Thus properties are similar to tropes only with respect of particularity. They are not basic bricks of reality as bundle theorists think.

²² By “qualitative content of a property” I mean what is left when we abstract from the formal function of the property—modification. For example a property *being red* has its formal function (modification) and its content: redness.

embodiment. I call this characteristic of properties “ontological transparency”. We do not see redness glued to a tomato: we see the tomato as modified by redness. In fact, a subject is not hidden behind properties but in a way, it is “expressed” by them. Scholastics used to say that *accidentia non sunt entia sed entis*—accidents (properties) are not beings but something from (of) a being. This slogan is usually interpreted in terms of inseparability (or dependence) of properties. I think it should be understood in terms of ontological transparency.

Since properties transfer their content to a subject, the replacement of properties is a genuine change of a subject itself.

Ontological transparency is a feature of all properties, and all properties are Aristotelian (accidental) forms. But in the case of many types of properties, it is rather hard to understand what it means that they are “ways”, “forms”, “shapes” or that they give some “figure” to a subject. Using these metaphors, we in fact use some model of the subject–properties structure. All properties are considered by analogy to shapes. But then a subject must be something analogical to a piece of plastic stuff. I call this model “the plastic stuff model”. Properties inform a subject as shapes inform the plastic stuff. The shape-stuff structure is more familiar to us. Of course, shapes themselves are properties, thus this analogy is so adequate in many respects—more adequate than the whole-parts model. Shapes are immanent, inseparable, identity-dependent and ontologically transparent properties of portions of plastic stuff. But not all properties are shapes and this is why this is only a model. It gives us an idea how to understand the thesis that properties are forms of a subject; forms which do not cover it. I think this model was implicitly presupposed in the Aristotelian substantialism. Indeed, one of the meanings of “morphe” is “shape” and a correlative of any form (substantial or accidental) was called “matter” (hyle).

The power of the plastic stuff model is obvious in the context of change—it helps us to understand why a subject is still the same although it undergoes changes. Shapes are not additional beings attached to the plastic stuff, so the change is not a succession of complexes “stuff + shape”, but it is the transformation of the stuff. Notice that stuff must be understood here as an abstract i.e. inseparable being. The stuff as a subject of a shape is not a lump of matter because a lump has some shape even if it is highly irregular. It is not a lump which survives the change but an inseparable layer of the material being.

Of course, the plastic stuff model has its constraints and it can be a source of problems if it is literally understood, i.e. when it is taken for the represented reality. Notice the plastic stuff is implicitly conceived as extended. But extension is a property as well. Thus, if the model is literally applied to extension, it must fail.

10 The Context of Interaction and the Functional Model

In the context of interaction properties are conceived as these objects’ characteristics which are responsible for their possibilities of actions and reactions to the environment’s impact. In other words, properties are dispositions or at least they (co-)determine ways how an object is disposed to behave in a certain way. An essence (or a substantial form) is the ultimate ground of thing’s dispositionality. In this context an essence was called “nature”—the principle of movement (in the broadest sense

of the term). If an essence is a subject of properties, the context of interaction and the problem of dispositions seem to be important to our understanding of the subject–properties structure. How?—let us start with an illustration²³:

Imagine we have a certain portion of ideal gas in a glass cylinder closed by a freely moving piston. Make also an idealizing assumption that this portion of gas is a single substance and not an aggregate of substances (gas particles). The gas has three properties: pressure, volume and temperature. Let us assume the gas interacts with the environment and can change the temperature. We know the ideal gas law:

$$nR = PV/T,$$

where P is for pressure; V is for volume; n is for the amount of gas (number of moles), R is the universal gas constant ($R = 8314 \text{ J/mol} \times \text{K}$); T is for temperature. Let $n = 10 \text{ mol}$ (and treat it as a constant), $V = 1 \text{ m}^3$, $T = 300 \text{ K}$, $P = 24,942 \text{ kPa}$.

Now imagine the gas is heated. How will it react to the impact of the environment? Obviously, the temperature of the gas will increase. Since the piston moves freely the pressure will be constant but the volume will increase as well. If the gas reaches the temperature 400 K , the volume is 1.3 m^3 .

What is the essence of the portion of gas? Let us limit this question only to the context of interaction: What is the ultimate ground of gas's disposition to react in a definite way? Notice the reaction was determined by the functional dependence between values of temperature and values of pressure, with other values remaining constant. Thus, the functional dependence between properties of the gas (expressed in the ideal gas equation) is the essence of this portion of gas. This is the real principle of activity. The volume increases when the temperature increases because the essence of gas makes the volume dependent in a specific way on the temperature. This way is determined by R and in that case by n (n is essential to *this* portion of gas). This functional dependence is different than other functional dependencies (for example different than the dependence between a compressing force and an extension of a spring as it is expressed in Hook's law) which are essences of other material objects (e.g. a particular spring).

The notion of essence as a functional dependence between properties has its sources in the Leibnizian doctrine of the law of the series, as it is interpreted by J.A. Cover and John O'Leary-Hawthorne (1999).²⁴ Leibniz (1989d, p. 436) identifies the scholastic substantial form with so called primitive active force and finally with the law of the series—i.e. a principle organizing and unifying all properties of a substance and determining its new states on the basis of a present state.²⁵ Cover and O'Leary-Hawthorne (1999, pp. 173–174) interpret the law of the series in terms of immanent function: “[j]ust as a mathematical function for some equation is not to be identified with the points making up the curve, so an individual's law-of-the-series is not to be identified with the ordered succession it uniquely specifies.” A sequence of accidents (a particular history of a substance) is like a set of a function's arguments

²³ The ideal gas example comes from Rosiak (2014).

²⁴ See also Rosiak (2014; 2006). The Leibnizian doctrine of preestablished harmony makes issues more complex but from Leibniz I buy only the idea of law-like essence.

²⁵ See Leibniz (1989a, p. 517), (1989b, p. 155), (1989c, p. 504), Gut (2004, pp. 81–82).

and values and the law of the series is like a function itself. Notice that authors assume a function cannot be reduced to a set of ordered pairs. They have a different concept of function: “[a] proper understanding of a function requires that one sees how by its very nature that function operates on arguments to deliver values.” (1999, p. 182). The function conceived this way is rather a principle of “transformation” of arguments into values. If the law of the series is analogous to the function it is easy to understand why the law is the principle of activity: “[let] us suppose, then that an individual substance, a law-of-the-series, is an immanent, contingent function having (total temporary) states as arguments and as values. The exercise of primitive active force consists in that immanent function’s yielding a state as value.” (Cover and O’Leary-Hawthorne, 1999, p. 229). The law transforms the present state of the substance into new states. Perhaps the many-variables function would be a better model but the core idea lying behind this analogy is clear even if the simplest functions are taken into account.

In other words: an essence of an object is an inner particular²⁶ functional law²⁷ governing the correlation of properties and this is why all changes an object undergoes obtain in some order and have certain dispositions.²⁸ Notice that law-like essences differ from each other. They are different ways of transformation of one state into another. Differences among objects cannot be reduced to differences among their properties. The difference of essence is more fundamental. The law-like essence specifies what kind of states it can have as its arguments and what kind of states can serve as values. Again we can use our analogy with a function: function $y=x^2$ and function $y=\log_2 x$ are primarily different principles of correlation of some arguments and values. This primordial difference implies further dissimilarities: an argument of the quadratic function can be any number belonging the set of real numbers but this function cannot have negative values whereas the logarithmic function is defined only for positive arguments but its codomain is the set of real numbers.

The analogy between law-like essences and mathematical functions can serve as a model which facilitates our understanding of the subject–properties structure. I call it “the functional model”. Such a view falls outside any simplified classifications. It is irreducible to the bundle theory (even sophisticated) nor to the substratum theory nor even to the substance theory conceived solely in the light of the plastic stuff model.

The law-like essence is not a quality similar to a sense quality (redness, squareness, wetness and so on) but it is the functional dependence obtaining among properties or it is a complex of such dependencies. It is the way specifying which

²⁶ “Particular” in the sense established above: non-sharable and non-instantiable. It does not mean that objects cannot have perfectly similar law-like essences.

²⁷ I use “law” only as a synonym of “functional dependence”. I do not want to say that laws of nature, as we know them from science, are immanent to objects. Aristotelians have always thought that essences of substances are the ultimate lawmakers (here I mean laws of nature). See Pruss (2013). This is also my view but additionally I think that essences exhibit some structural affinities to some laws of nature.

²⁸ I am aware that in a sense I invert the relationship between laws and dispositions as it is usually conceived on the ground of dispositional essentialism. However, I am not a dispositional antiessentialist. For me laws stand in essential and rigid correlation to dispositions but law-like essences ground dispositions (real possibilities of objects’ actions), not vice versa.

properties can coexist with each other. On the ground of this model properties are like values and arguments of the functional dependence. The subject is the functional law governing the coexistence of properties. The function determines possible sets of coexistent properties but actual properties “saturate” the function. This “saturation” does not change the functional dependence itself, in the sense they do not make it a function of another type. This is the way how properties supplement the subject.

Yet a mathematical function is only a model. For example it is perfectly suitable only for quantitative characteristics of things whereas the real law-like essences are principles of correlation of properties of all types. The essence of human being is a complex functional dependence between purely physical properties (mass, volume, temperature), biological properties (warm-bloodedness, anatomical features etc.), and mental abilities (intelligence, perceptual abilities etc.). Moreover we should remember that law-like essences are not abstract in the same sense as mathematical functions are. Law-like essences exist in space and time although they do so because concrete objects are spatiotemoral. That essences are abstract means only that they are inseparable from properties and not that they are mathematical objects.

11 Concluding Remarks

The two presented models are complementary to each other and they enable us to understand different aspects of the subject–properties structure. They also show the explanatory power of substantialism as the doctrine which in my opinion is the best philosophical explanation of facts exhibited in the three contexts: of comparison, of change and of interaction. By no means substances are static beings which passively bear the environmental impact. First, they really change because they are modified by new properties (and this is illustrated by the plastic stuff model). Second, they endure in time and can survive some changes because they have law-like essences due to which the influence of the external world can be balanced by new properties which “saturate” an essence performing the role of a subject (as this is illustrated by the functional model). Moreover, the two models make the concept of substance more flexible and applicable to different domains of reality. The plastic stuff model fits better for “medium-sized dry goods”, i.e. for objects known to us from the everyday experience. The functional model seems to be more suitable in the context of science. If elementary particles are substances,²⁹ they are subjects of properties in the sense their essences are functional dependencies between some physical properties (spin, mass, charge, velocity etc.). Such a possibility of interpretation must be carefully examined. Yet it shows that substantialism is not a relic of the past but can still be a serious option in the context of philosophy of science.

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²⁹ Personally I doubt they are and thus I think they are not fundamental bricks of reality but can exist only as parts of substances. But now I am considering only some possibility.

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References

- Benovsky J (2008) The bundle theory and the substratum theory: Deadly enemies or twin brothers? *Philos Stud* 141:175–190
- Chrudzinski A (2002) Two concepts of trope. *Grazer Philos Stud* 64:137–155
- Chrudzinski A (2005) Internal, external and intra-individual relations. *Axiomathes* 15:487–512
- Correia F (2005) Existential dependence and cognate notions. *Philosophia Verlag*, Munich
- Cover JA, O’Leary-Hawthorne J (1999) Substance and individuation in Leibniz. Cambridge University Press, New York
- Denkel A (1996) Object and property. Cambridge University Press, New York
- Gut P (2004) Leibniz. *Myśl filozoficzna w XVII wieku*. Wydawnictwo Uniwersytetu Wrocławskiego, Wrocław
- Heil J (2003) From an ontological point of view. Clarendon Press, Oxford
- Ingarden R (2013) Controversy over the existence of the world, vol I (trans: Arthur Szylewicz). Peter Lang, Frankfurt am Main
- Ingarden R (2016) Controversy over the existence of the world, vol II (trans: Arthur Szylewicz). Frankfurt am Main: Peter Lang
- Kanzian C (2016) *Wie Dinge sind. Noch eine Alltagsontologie*. De Gruyter, Berlin
- Keinanen M (2005) Trope theories and the problem of universals. *Dark Oy, Vantaa*
- Koslicki K (2013) Ontological dependence. An opinionated survey. In: Schnieder B et al (eds) *Varieties of dependence: ontological dependence, grounding, supervenience, response-dependence*. Philosophia Verlag, Munich
- Leibniz GW (1989a) Correspondence with de Volder. In: Leibniz GW (ed) *Philosophical papers and letters* (trans: Loemker LE). Kluwer Academic Publishers, Dordrecht
- Leibniz GW (1989b) On the nature itself, or on the inherent force and actions of created things. In: Leibniz GW (ed) *Philosophical papers and letters* (trans: Loemker LE). Kluwer Academic Publishers, Dordrecht
- Leibniz GW (1989c) Notes on the reply of Foucher to the criticism of his criticism of the ‘Recherche de la Verite’. In: Leibniz GW (ed) *Philosophical papers and letters* (trans: Loemker LE). Kluwer Academic Publishers, Dordrecht
- Leibniz GW (1989d) Specimen dynamicum. In: Leibniz GW (ed) *Philosophical papers and letters* (trans: Leroy E. Loemker). Kluwer Academic Publishers, Dordrecht
- Loux MJ (2006) *Metaphysics. A contemporary introduction*. Routledge, London
- Lowe EJ (2004) *The possibility of metaphysics*. Clarendon Press, Oxford
- Lowe EJ (2005) Substance and identity. In: Tretin K (ed) *Substanz. Neue Überlegungen zu einer klassischen Kategorie des Seienden*. Klostermann, Frankfurt am Main
- Lowe EJ (2006) *The four-category ontology. A metaphysical foundation for natural science*. Clarendon Press, Oxford
- Lowe EJ (2013) Body, soul and self. In: Szatkowski M (ed) *Dualistic ontology of the human person*. München, Philosophia
- Macdonald C (2005) *Varieties of things. Foundations of contemporary metaphysics*. Blackwell, Oxford
- Martin CB (1980) Substance substantiated. *Aust J Philos* 58:3–10
- Mulligan K (1998) Relations — through thick and thin. *Erkenntnis* 48:325–353
- Oderberg DS (2011) Essence and properties. *Erkenntnis* 75:85–111
- Oliver A (1996) The metaphysics of properties. *Mind* 105:1–80
- Pasnau R (2011) *Metaphysical themes 1274–1671*. Clarendon Press, Oxford

- Pruss A (2013) Aristotelian forms and laws of nature. *Analiza i Egzystencja* 24:115–132
- Rosiak M (2006) Formal and existential analysis of subject and properties. In: Malinowski J, Pietruszczak A (eds) *Essays in logic and ontology*. Amsterdam-New York, Rodopi
- Rosiak M (2014) Substantiality and causality. Classical and transcendental approach. In: Szatkowski M, Rosiak M (eds) *Substantiality and causality*. De Gruyter, Berlin
- Scaltsas T (1994) *Substances and universals in Aristotle's "Metaphysics"*. Cornell University Press, Ithaca
- Scaltsas T (2015) Substantial holism. *Philos Inq* 39:146–163
- Simons P (1994) Particulars in particular clothings: three trope theories. *Philos Phenomenol Res* 54:553–575
- Simons P (2005) The ties that bind: What holds individuals together? In: Trettin K (ed) *Substanz. Neue Überlegungen zu einer klassischen Kategorie des Seienden*. Klostermann, Frankfurt am Main
- Tahko TE, Lowe EJ (2016) Ontological dependence. In: Zalta EN (ed) *The Stanford encyclopedia of philosophy* (Winter 2016 Edition). <https://plato.stanford.edu/archives/win2016/entries/dependence-ontological/>. Accessed 12 Sept 2019

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