Identity and Individuation

On the sortal dependency of identity and individuation

UNIVERSITY OF UTRECHT

DEPARTMENT OF PHILOSOPHY

THESIS IN CONCLUSION OF THE RESEARCH MASTER'S PROGRAMME IN PHILOSOPHY

DATE: JUNE 2011

BOB COENRAATS

STUDENT NUMBER: 3109011

FIRST SUPERVISOR: DR. T. MÜLLER

SECOND SUPERVISOR: DR. M. LIEVERS

THIRD SUPERVISOR: PROF. DR. P. ZICHE

Contents

Introduction ... 3
1. Individuation, identity and sortal dependency ... 7
1.1 The sortal dependency thesis ... 7
1.2 Identity and individuation ... 8
1.2.1 Absolute and relative identity ... 8
1.2.2 Identity and time ... 9
1.2.3 Identity and sortal dependency ... 9
1.2.4 Individuation: singling out ... 10
1.2.5 Individuation: individuality ... 11
1.3 Substance, individuals and kinds ... 12
1.4 Sortal concepts and criteria of identity ... 13
1.5 The sortal dependency thesis of identity and individuation ... 15
2. The Sortal Dependency Thesis of Identity ... 17
2.1 The cases of supposed relative identity ... 17
2.2 The sortal dependency against relativism ... 19
2.3 Identity and time ... 21
2.4 Persistence, identity and time ... 22
2.5 Identity and sortal dependency ... 24
3 Singling out objects in experience ... 25
3.1 Sortal dependency and singling out ... 25
3.2 Experience, objects and sortal concepts ... 25
3.3 Categorialism ... 26
3.4 Sortal dependency and objects of experience ... 28
4 Individuation and Kinds ... 29
4.1 Sortal dependency of individuation ... 29
4.2 Natural kinds ... 30
4.2.1 Wiggins's conceptual realism ... 31
4.2.2 Kinds as patterns ... 33
4.2.3 Kinds and laws ... 36
4.2.4 The plasticity of species ... 37
4.3 Biology and kinds: the species problem ... 38
4.3.1 Species as individuals ... 38

4.3.2 The biological species concept 39
4.3.3 The taxonomic practice and kinds 39
4.4 Biological Individuals 43
4.4.1 Hybrid individuals 43
4.4.2 Chimeras 44
4.4.3 Small cellular-levels of life and the category of *living thing* 45
4.4.4 The explosion of the examples: broadening the search 46
4.5 Artificial biological individuals 47
4.5.1 Genetic manipulation and cultivation 48
4.5.2 Grafting and the individuals 48
4.6 Biological individuals, kinds and sortal dependency of individuation 49
5 Identity, Individuation and Biology 51
5.1 Natural Kinds 51
5.2 Identity, persistence and individuation without sortal dependency 51
5.3 Metaphysics and biology 52
5.4 Identity, persistence and metaphysics 53
6. Concluding Remarks 54
Bibliography 56

Introduction

When you look in the garden, you will probably find grafted plants. Those grafted plants are made out of two different kinds of plants with different characteristics. Usually, the roots of a grafted plant are extraordinary strong and its upper part has the nice blossoms we want in out garden. The grafted plant is made out of two individual plants, so what makes that the grafted plant is an individual thing? The grafted plant is also capable of persisting, even though it is made out of two different plants. What ensures that it is the same thing over time? These two questions, the questions of *individuation* and *identity,* will be the two main topics of this paper.

Let us consider a less complicated case, my cat. My cat, Ceres, runs around, plays with her toys and eats. And we recognize that the remains the same organism while she does all these things. We can wonder what principles ensure that she remains the *same cat* over time, that she *persists*. The two extremes for answering the question of identity are the suggestions put forth by P.T. Geach on the one hand, and M. Ayers on the other.[1] According to Geach, identity is entirely dependent on the sortal concepts we use in our identity statements: the statement '*a* is identical to *b'* is actually of the form '*a* is the same *f* as *b'*, where *f* is a substantive general term, 'cat' in our example.[2] This theory of identity allows that it is possible that the identity of *a* and *b* is true under one sortal concept, but not true under another. This is known as the thesis of *relative identity*. This theory seems to leave little room for the contribution that objects themselves have to identity, which is the principal starting point for the theory of identity as put forth by Ayers. According to Ayers, the identity of individual things is not dependent upon anything else than the things themselves and the coherence of the matter that forms them. Both positions are considered to be unattractive by the defenders of the third option, put forth by David Wiggins and Jonathan Lowe.[3] According to them, we should both recognize the role of *sortal concepts* and of the *objects* in matters of identity. They therefore agree with Geach that identity statements are always of the form '*a* is the same *f* as *b*', but agree with Ayers that identity is determined by the objects themselves, and hence they reject Geach's thesis of *relative identity*. On their theory, identity is therefore *sortal dependent,* but also *absolute.* This last theory is called the s*ortal dependency thesis.*

This theory of *sortal dependency*, combined with *absolute* identity has consequences for our second question, the question of *individuation*. According to this theory of sortal dependency, the individuality of objects such as my cat, is also determined by the *kind of thing* the object is. On this theory my cat is distinct from other things and is *what she is*, because she is a cat: her kind-membership is not only important for her *identity* and *persistence*, but also for her being an individual *thing*, or *substance*.

Why should we want to introduce the sortal dependency thesis? The framework that is established by the sortal dependency thesis has some favorable consequences. First and foremost, it is supposed to provide us an account of personal identity. David Wiggins[4] argues for an account of personal

[1] See (Geach 1962-8/1980) and (Ayers 1991b).
[2] Also called a 'sortal concept'.
[3] See (Wiggins 2001) and (Lowe 2009).
[4] (Wiggins 2001, Ch 7).

identity based on the idea that *human being* and *person* have to have the same principles of individuation and hence that the statement '*a* is the same person as *b'* will be true whenever the statement '*a* is the same human being as *b*' is true. The sortal dependency thesis makes it possible to claim that a *person* persists or ceases to exist when the *human being* that is this person persists or ceases to exist. This account of personal identity has interesting consequences. For example, it escapes the problem of having to decide, when we split one human brain into two and create from the halves two new beings, which one of the two is the *same person* as before the drastic splitting-event. On Wiggins's account the answer to the question which one is the *same person* is the same as the answer whether one of the two is still the same *human being* as before the splitting event, which seems to be an empirical question and is at least less difficult to answer.[5]

Another advantage of the sortal dependency thesis is that it can serve to establish a ground for speaking of *potentialities* and *dispositions* of individuals. The sortal dependency thesis establishes a necessary connection between kings and their individuals. This is most clear in Lowe's theory.[6] The kind that is instantiated by an individual object, because of the necessary relation between the kind and the individual, provides a standard for speaking about the individual's dispositions. A cat dispositionally has four paws, on Lowe's account, because it instantiates the kind *cat* which has as attribute 'four paws'. So by considering an individual's real kind, *cat* in this example, we can speak of dispositions for individuals falling under the kind.

If we extend this further, we even find suggestions that the sortal dependency thesis provides a ground for normativity and even morality. The revival of an ancient tradition of virtue ethics, most prominently defended by Philippa Foot,[7] has been thought defendable because of the evaluative role of kinds made possible by the sortal dependency thesis. On this theory of *natural normativity*, we can ground normative standards for individuals, by investigating what is good for the kind they instantiate: because it is good for trees to have roots that grow under the ground, it is good for an individual tree to have its roots under the ground and bad to grow them above the ground.

In this paper I bring forth a criticism of the sortal dependency thesis by arguing that, first we have a better alternative for understanding identity and persistence, and secondly that it is in tension with biological phenomena.

The first chapter will introduce the sortal dependency thesis and the relevant philosophical concepts. It briefly discusses the concepts of *identity, individuation, substance*, *kinds*, *sortal concepts* and *criteria of identity*. This discussion will on the one hand explain the sortal dependency thesis, and on the other hand determine the use of the relevant concepts for the following discussion. It is explained that the sortal dependency thesis has three distinctive aspects that should be treated separately. First of all, it is a thesis about *identity and persistence*. Secondly it is a thesis about our capacity to *single out objects in experience*. And thirdly it is a thesis about *individuation*.

The second chapter deals with problems of identity. For identity, it is argued that we do not need sortal dependency in order to avoid relative identity. It is argued that the threat of relative identity arises when identity is claimed *over time* and that we can avoid this by regarding identity as the

[5] This example is from (Shoemaker 1963), and is known as the Brown-Brownson case.
[6] (Lowe 2009, 10).
[7] See her (Foot 2001) and also (Anscombe 2007 [1958]).

simple relation any object has with itself, as Lewis has argued.[8] Next, it is argued that in order to understand *persistence*, we do not *need* the sortal dependency of identity. The sortal dependency requires that the persistence object not only ensures that it remains *the same object*, but also the *same kind of object* over time. It is argued that when we consider objects to be materially coherent unities, we can understand persistence in such a way that this implication is avoided.

Chapter three will discuss the sortal dependency thesis for our capacity to single out objects in experience. First is argued that the sortal dependency thesis is far too demanding. For singling out an object in experience, we need that there are some binding principles such that unities can be given, not that we already have some sortal qualification of the unity that is presented in experience. Secondly it is argued that the sortal dependency theory faces a problem in the case that we are mistaken in our sortal classification of objects that are given in experience.

Chapter four discusses the sortal dependency thesis of *individuation.* It will be explicated that the sortal dependency theory needs a conception of natural kind that does not allow for vagueness as to whether an individual belong to that kind or not.[9] It will be argued that the concept of 'natural kind' required by the sortal dependency theory is not present in biological practice. The taxonomic practice does not use the relevant concept of kind, as will be argued for with the example of the *platypus,* and the phenomenon of *ring species.* It is explained that the sortal dependency thesis of individuation faces a dilemma: either it has to make a move *downwards* and hold that the relevant concept of natural kind is found lower in the taxonomic system. This strategy can be identified in Wiggins's work. Or it has to make a move *upwards*, and hold that the relevant aspects of natural kinds are at higher levels of the taxonomic system. This is the strategy taken by Lowe. Both strategies are problematic, for they will either result in an abandonment of the sortal dependency thesis for individuation, or remain in tension with biological phenomena. Interesting examples of these biological phenomena, such as *hybrid individuals*, *chimeric individuals*, and some *micro-organisms* are presented to strengthen the dilemma. And it will be argued that the most problematic cases are found in our practices of *cultivation* and *grafting*.

Chapter five tries to indicate the consequences of the preceding chapters and argues for a coherent *realist* picture of identity and individuation. It deals with the consequences of the results of the investigations of the preceding chapter such as the role of metaphysics and biology and the conception of natural kinds. It is argued that the realist notion of substance, as defended by Ayers,[10] is much better capable of accommodating the biological individuals discussed in chapter four, and that it provides us with a sufficient understanding of *persistence* as is required by the account presented in chapter two.

The most important upshot of this discussion of the sortal dependency thesis will be threefold. It first provides a better understanding of the discussion of identity and persistence and the role of time as will become clear from the discussion of relative identity in chapter two. Secondly it will help to get a better grasp on the concept 'natural kind' and the related debate about nominalism and realism of essences. The discussion of chapters four and five will argue that the right conception of 'natural

[8] (Lewis 1986).
[9] It may be vague for *us*, but *in principle* an answer as to whether an individual belongs to a specific kind or not must be possible.
[10] (Ayers 1991b).

kind' for as far as biological organisms are considered, is one of *nominal essence*: classification of organisms into natural kinds is done by their accordance with *nominal essence*. And thirdly it will give insight of the interplay between biological science and metaphysics, because the upcoming discussion shows the importance of knowledge of the biological science in answering the metaphysical questions of identity and individuation.

1. Individuation, identity and sortal dependency

This chapter introduces the philosophical and conceptual background of the sortal dependency thesis in order to make clear what it tries to establish. First, the sortal dependency thesis is introduced, and subsequently I introduce the important concepts of *identity, individuation, substance*, (*natural*) *kinds, sortal concept* and *criteria of identity,* and explain how these are related to our discussion of the sortal dependency thesis.

In order to avoid confusion, one important remark has to be made from the outset. The thesis will mainly be about living things and their kinds, i.e. their so called *natural* kinds. This might raise some questions of why I leave, for example, artifacts and artifact-kinds out of the discussion, because many examples that problematize identity are about artifacts, like Theseus's ship.[11] This is correct, but I believe that we should first discuss the matters of identity and individuation for natural objects, before we complicate matters even more and discuss artifacts. With regards to the class of *natural kinds*, I will mainly restrict myself to discussing kinds of biological organisms, and I specifically do not discuss *chemical kinds*. For even if the sortal dependency thesis could work for these kinds, this is far too little to establish an interesting notion of sortal dependency; for persistence, identity and individuation, the most interesting category is living objects.

1.1 The sortal dependency thesis

The most elaborate treatment of the sortal dependency thesis can be found in Wiggins's *Sameness and Substance Renewed*.[12] In this work, Wiggins tries to establish a theory of individuation that elucidates *identity*, *persistence of substances*, and our cognitive capacity to *single out* a thing at a time.[13] The most important aspect of Wiggins's theory of individuation is the sortal dependency thesis, which he calls **D**:

> **D**: $(a = b)$ if and only if there exists a sortal concept f such that:
> (1) *a* and *b* fall under f;
> (2) to say that *x* falls under f or that *x* is an f is to say what *x* is (in the Aristotelean sense isolated)[14];
> (3) *a* is the same f as *b,* that is coincides with *b* under f in the manner of coincidence required for members of f (…) (Wiggins 2001, 56)

Here, *a* and *b* stand for substances and, *f (*and *g* in the following formula) is a sortal concept. The sortal dependency, as put forth in this quote, concerns *identity*, but Wiggins's elucidation of **D** into the further **D**-principles **D**(i) – **D**(viii) show that it is also supposed to say something about *the existence of things* as well:

> **D**(ii): $\forall x \exists g \forall t[(x\ exists\ at\ t) \rightarrow (g(x)\ at\ t)]$ [15]

This principle **D**(ii) says that when x exists, it exists as falling under a single sortal concept *g* at any time of its existence, or if we take the contraposition, if x would not fall under the same sortal concept *g* at any time of its existence, it would not exist. The sortal dependency as put forth by

[11] Originally from (Hobbes 1839-45 [1655]).
[12] See (Wiggins 2001), especially in his chapter two.
[13] See (Wiggins 2001, 1).
[14] What the 'Aristotelean sense' is, will be clear in section 1.3.
[15] I write the universal quantifier as $'\forall x'$ where Wiggins writes $'(x)'$ (Wiggins 2001, 64).

Wiggins therefore not only contains the claim that identity is sortal dependent, but also that the existence of an object is sortal dependent, which means that an object always has to exist as member of a kind (in the Aristotelean sense). Or, in Wiggins's own terms, that '[e]verything that exists is a *this such'.* (Wiggins 2001, 22)

Before I discuss the topics of identity and individuation in detail (which is done in chapter two), it is useful to elucidate some concepts and philosophical terminology that play an important role in the discussion of the sortal dependency thesis.

1.2 Identity and individuation

1.2.1 Absolute and relative identity

'Identity', in our discussion, is supposed to express *sameness*.[16] Thus '*a* is identical to *b*', can be reformulated, without loss of content, as '*a* is the same as *b'.* Also the sameness is not meant to express *qualitative* sameness, but *coincidence: 'a* is the same as *b*' means '*a* coincides with *b*'. One can be interested in identity at three levels, the level of logic, the level of semantics and the level of metaphysics. Our concern here will be at the level of metaphysics: identity is supposed to be a metaphysical relation. But the relation of the metaphysical conception of identity with logic and semantics is intimate. For example, Leibniz's Law, which says that $\forall x \forall y \left((x = y) \rightarrow (\phi x \leftrightarrow \phi y)\right)$[17], is considered to be central to our understanding of identity. It is important because it is supposed to be at the core or our common notion of identity, as Wiggins says:

> Leibniz's Law marks off what is peculiar to real identity and it differentiates it in a way in which transitivity, symmetry and reflexivity (all shared by *exact similarity, weighing the same, having exact qualities in pay,* etc.) do not. (Wiggins 2001, 27)

It seems impossible to *define* 'identity'; even Leibniz's Law is circular because it has to employ the notion of 'same property', and I will not take up the task of defining 'identity'. The position that Leibniz's Law is central to our understanding of 'identity' is called 'absolutism'. Absolute identity can be symbolized as follows:

$$\exists f \left(a \underset{f}{=} b\right) \rightarrow (\forall g(g(a) \rightarrow \left(a \underset{g}{=} b\right))^{18}$$

This says that if for some *f*, *a* is the *same f* as *b*, then if *a* is a *g*, a is the *same g* as b as well, where *f* and *g* are sortal predicates. This is a direct consequence of Leibniz's Law, because by Leibniz's Law, any property that belongs to *a*, also belongs to *b*. The thesis of absolute identity is challenged by purported examples of *relative identity* brought forth by Geach.[19] Relative identity challenges absolutism by proposing examples where the absoluteness of identity seems to fail, thus for which the following holds:

$$\exists f \exists g [\left(a \underset{f}{=} b\right) \wedge \neg \left(a \underset{g}{=} b\right) \wedge (g(a) \vee g(b))]$$

[16] See (Wiggins 2001, preamble).
[17] This is the *indiscernibility of identicals,* not to be confused with $\forall x \forall y((x = y) \leftrightarrow (\phi x \leftrightarrow \phi y))$ which also contains the *identity of indiscernibles*, which is much more controversial.
[18] See (Wiggins 2001, 25) and (Lowe 2009, 73).
[19] (Geach 1962-8/1980), I discuss two of the examples in section 2.1.

A case of identity is *relative* when *a* is the *same f* as b, but not *the same g* as b, even though either *a* or *b* is a *g.* If there is a case for which this scheme holds, absolute identity does not hold, and thereby Leibniz's Law would have been refuted as a principle for identity. There are several examples that seem to threaten absolute identity this way, and I discuss the most prominent ones in section 2.1.

1.2.2 Identity and time

With regard to identity, an important distinction has to be made between identity *at a time,* and *over time.* Identity can be stated about a thing *over time*, or *at a specific time*, the first being diachronic identity statements, the second synchronic identity statements. A true diachronic identity statement identifies an object *a* at time t_1 with *the same* object *b* at time t_2, and a true synchronic identity statement identifies an object *a* with object *b* at the same time t_1. *Metaphysically,* the identity over time is called *persistence* of an object: it persists through time, and thereby remains *the same* over time. With regard to persistence of an object, the sortal dependency thesis claims that it is the *kind* of thing it is, that grounds its persistence: a thing is always the *same f* over time, *f* being its sort. The identity of an object *at a time* is called its *distinctness*, its not being another thing at that time. With regard to the distinctness of an object, the sortal dependency thesis claims that it is the *kind* of thing it is that determines that it is distinct from other things. This distinction between identity *at a time* and *persistence through time* will be one of the important aspects of our discussion of identity in section 2.3. It will be argued that *diachronic identity statements,* in the way the sortal dependency theorist interprets them, are not truly identity statements. Sortal dependency of identity implies that persistence, the identity of an object over time, implies sameness of kind-membership over time. In section 2.4 it is argued that the persistence of an object does not have to save its sameness of kind-membership *over time*.[20]

1.2.3 Identity and sortal dependency

For Geach's theory of relative identity, it is the level of *semantics* that grounds the metaphysical relation of identity, which might be called a form of *idealism* with regards to identity. If we consider, on the other hand, Ayers's position, the metaphysical identity of objects takes care of itself, which is a strong form of *realism* about identity. According to Ayers, it is the material unity of an object that ensures its identity.[21] Lowe and Wiggins set out to establish an intermediary position between the idealistic aspects of Geach's position and the strong realism of Ayers's theory. They try to reconcile the levels of semantics and metaphysics. Lowe tries to achieve this by arguing that he is after 'metaphysically grounded semantical rules' (Lowe 2009, 26) for the criteria of identity.[22] He argues that criteria of identity are not just semantical rules, associated with our sortal concepts, but that they are grounded in the objects themselves. For Wiggins, the intermediary position is established by his suggestion that the substance concepts[23] are *real,* and that we form *conceptions* of them.[24]

According to the sortal dependency thesis, sortal concepts govern identity. Thus a statement $(a = b)$ should be analyzed as $\left(a \underset{f}{=} b\right)$, where *f* is a sortal concept. These two forms are dependent upon

[20] For a further discussion of identity over time and at a time, see (Gallois, 2011).
[21] (Ayers 1991b).
[22] 'criteria of identity' is explained in section 1.4.
[23] Substance concepts are according to Wiggins a sub-class of sortal concepts. See section 1.4 for a further discussion on sortal concepts.
[24] See his (Wiggins 2001), specifically the preamble and chapter five.

each other, they stand in an equivalence relation: $\left(a = b \leftrightarrow \exists f \left(a \overset{=}{}_{f} b\right)\right)$.[25] The sortal dependency theory claims that the identity, both *at a time* and *over time*, of an object is dependent on the kind of object it is. Therefore the *f* in the equivalence between $\exists f \left(a \overset{=}{}_{f} b\right)$ and $(a = b)$ is a real *kind* or *sort*, and in Wiggins's theory, it are the *real* concepts.[26] The difference between Geach, on the one hand, and Wiggins and Lowe on the other, is that Geach would not accept this metaphysical interpretation of the sortal depencency thesis for identity. For Geach statements of the form $(a = b)$ are only elliptical, and dependent upon the form: $\left(a \overset{=}{}_{f} b\right)$.[27] He could go as far as to accept the equivalence only in the direction from the $\exists f \left(a \overset{=}{}_{f} b\right)$ towards $(a = b)$: $\left(\exists f \left(a \overset{=}{}_{f} b\right) \rightarrow (a = b)\right)$, under the interpretation of *f* as a sortal concept (in his terms a substantival general term), but not the other way around.

1.2.4 Individuation: singling out

A second aspect of the sortal dependency thesis is that it serves to elucidate our capacity of 'singling out objects in experience', called *individuation*. I will make a distinction between two aspects of individuation. On the one hand, individuation is an act of singling out something in experience and thinking of and referring to things[28], while on the other hand, it is a metaphysical principle of the individuality, the being, of objects. It is important to distinguish between these two aspects of the term 'individuation', for the distinction will play an important role in the structure of our discussion in chapters tree and four.

Singling out is, according to the sortal dependency thesis, governed by sortals: to single out something in experience, is to single it out as something of a kind:

> To single x out is to isolate x in experience; to determine or fix upon x in particular by drawing its spatio-temporal boundaries and distinguishing it in its environment from other things of like and unlike kinds. (…) we shall discover reason to think that there could be no singling out *tout court* unless there could also be singling out *as.* (Wiggins 2001, 6-7)

We do not see things only as things, we do not refer to objects only as objects, according to the sortal dependency of individuation. The **D** principles tell us that it is the *sortal concept* that governs our capacity of individuation.

There is at least a minimal requirement with regard to *singling out* something, we should accommodate. It is found in Quine's insights about ostension:

> Pointing is of itself ambiguous as to the temporal spread of the indicated object. (…) Pointing to *a*, (…) could be interpreted either as referring the river Caÿster of which *a* and *b* are stages, or as referring to the water of which *a* and *b* are stages, or as referring to any one of an unlimited number of further less natural summations to which *a* also belongs. Such ambiguity is commonly resolved by accompanying the pointing with such words as 'this river', thus appealing to a prior

[25] See (Wiggins 2001, 25) and (Lowe 2009, 72).
[26] More on Wiggins's specific theory of *conceptual realism* in section 4.2.
[27] (Geach, Logic Matters 1980 [1972], Chapter 7 238-250).
[28] I do not wish to take up the task to discuss whether perceiving things is already an aspect of thinking or judging or not, for that will not influence the principal points of our discussion.

> concept of a river as one distinctive type of time-consuming process, one distinctive form of summation of momentary objects. (Quine 1953, 67)

Ostension is, according to Quine, only clear if the accompanied concept, in this example 'river', is clear. If one disagrees with Quine that a river is a 'time consuming process' or a 'summation of momentary objects', one should realize that this is not the point here. The point is that the ostension is only as clear as the accompanying concept, no matter what that concept is. If one has another conception of 'river' than Quine here, the ostension that is accompanied by that concept 'river' just has another spatiotemporal boundary. This Quinean demand for singling out is far less demanding than what is claimed by a defender of the sortal dependency theory. On this Quinean demand, all that is needed from the concept is that it give spatiotemporal boundaries, while the sortal dependency thesis claims that the sortal concepts have much more importance here: on this thesis, a sortal concept does not only tell us what the boundaries of the thing singled out is, it also tell us *what the thing is* that is singled out.

Chapter three argues that the demand of the sortal dependency thesis for our capacity of singling out objects in experience is too demanding, and that the Quinean requirement of spatiotemporal determination is sufficient.

1.2.5 Individuation: individuality

For any object we can single out, we can also wonder by virtue of what the object is such that it *can* be singled out: what makes an object the thing it is? This is the question of the metaphysical principle of individuation. As we can see in Wiggins's principle **D**, an object's existence as an individual is claimed to be sortal dependent as well. The sortal dependency thesis is also meant to answer what it is that makes an object distinct from other objects, what determines its individuality.

For this *metaphysical* principle of *individuation*, the sortal dependency thesis says that the existence of an individual thing is always existence as a *thing of a specific kind.* And as we saw from **D**ii an object has to belong to the same kind throughout its entire existence. The sortal dependency of individuation therefore not only implies the rejection of what is called the 'bare particular', a *thing tout court* that only binds properties and is only the subject of predication,[29] but it implies *essentialism.* What an object *is* is determined by its *essence*: its real kind. According to the defenders of the sortal dependency thesis, something is an individual thing *because* it is a thing of some essential kind.

It is disputed whether the notion of a bare particular is really that problematic,[30] and also whether the accompanied essentialism of the sortal dependency of individuation is necessary for the existence of things. Ayers forcefully argues that what is necessary for an object to exist, as a substance, is its *material unity*. We neither have to accept a notion of 'bare particular' or any form of essentialism if we take his theory of 'substance'.[31] I agree with Ayers on this, and will elucidate on and defend this specific conception of 'substance' in chapter five.

[29] See (Sider 2006) on the notion of 'bare particular'.
[30] See for example (Sider 2006).
[31] See his (Ayers 1991b) and his Locke interpretation (Ayers 1991a). I will argue for Ayers's conception of 'substance' in chapter five.

In order to be able to argue for either the position of the sortal dependency theorist or the realist with regard to individuation, we need to have a better understanding of the notions 'substance', 'kinds' and 'particular', or, 'individual'. These notions are explicated in the next section.

1.3 Substance, individuals and kinds

Aristotle is one of the most important philosophers, historically, who discussed the notion of substance. An important distinction Aristotle made in his treatment of substance is the distinction between primary and secondary substance. A primary substance is what we now call the 'individual'. It is called primary because that which designates the substance can only be a subject, and one cannot predicate it of anything:

> A *substance* – that which is called substance most strictly, primarily, and most of all – is that which is neither said of a subject, nor in a subject. (Aristotle, Categories, 2a12)

A primary substance is the continuant of which we can say that it moves, runs, persists etc. According to Wiggins, there has to be, for any thing of which we can say that it moves, runs, persists or even that it is white, a nameable kind to which the thing belongs. It will be this *kind* that enables us to answer the question 'what is it that runs, persists and is white?':

> (…) [F]or any thing that satisfies a predicate such as 'moves', 'runs' or 'white', there must exist some known or unknown, named or nameable, kind to which the item belongs and by reference to which the 'what is it' question *could* be answered (Wiggins 2001, 21).

What Aristotle called the *secondary substance* is that which answers this question 'what is it?' for a primary substance. It is, for instance, 'a horse', or 'a man'. The secondary substances are predicable of the individuals, but not *in* the individuals. They are the kinds of primary substances:

> The species in which the things primarily called substances are, are called *secondary substances,* as also are the genera of these species. (Aristotle, Categories, 2a15)

The species are, according to Aristotle, more a substance than the genus, because they are nearer to the primary substance. This is so, because, in answering *what it is* for a primary substance, the species is more informative than the genus. (Aristotle, Categories, 2b6-22) Wiggins believes that these kinds are *real,* that they are nameable and are, as advocated by the sortal dependency thesis, the source of the individuality and identity of (primary) substances. So since any individual has to belong to such a *real* kind throughout its existence which answers the question 'what is it?', the sortal dependency thesis advocates a form of *essentialism*.

Primary substances are divided into kinds, but it is contested by what principles the division of substances can be made. For Aristotle, the division of primary substances into species is dependent on *what it is*, its *real essence* or *form.* This, however, is contested to be possible by empiricists, who believe that the division of substances is made, not in accordance with *real essence*, but *nominal essence.*

Locke, as one of the most prominent defenders of empiricism, argued that we *construct* general ideas out of our *simple ideas* or *impressions*.[32] General words are thus nothing more than constructs

[32] (Locke 1996 [1689], III.iii.6-11).

of our understanding.[33] Locke, in the new mechanistic tradition of his time, was able to reintroduce what Aristotle called 'secondary substance', identified with form, or idea, not as *real essence*, but as *nominal essence*.[34] Locke rejects the thought that we know the real essence of things, the secondary substance in Aristotle's sense. All we seem to know of a *real* substance, as he famously said, is that it is a 'supposed, I know not what, to support those ideas we call accidents'.[35] The result is a position in which there is no, at least no attainable, answer to the question 'what is it?' in Aristotle's sense of the question. Our ideas of kinds are dependent upon relations between the given simple ideas we have of individuals, and the accordance of the simple ideas with our abstract ideas is what answers the question 'what is it?'. The division of substances, according to Locke, is based upon accordance of individuals to these abstract ideas of kinds, the *nominal essences*:

> (…) *substances are determined into sorts*, or *species*; and that 'tis evident, is *by the nominal essence*. For 'tis that alone, that the name, which is the mark of the sort, signifies. (…) Why do we say, this is a *horse*, that a *mule*; this is an *animal*, that a *herb*? How comes any particular thing to be of this or that sort, but because it has that nominal essence, or, which is all one, agrees to that abstract *idea,* that name is annexed to? (Locke 1996 [1689], III.iv.7)

The classification into sorts, according to Locke, is thus not determined by *real essences*, but by *nominal essences.* The answer to the question 'what is it?' is determined by agreement of an object to an abstract, general idea which is a creation of our understanding. (Locke 1996 [1689], III.iii.11) And thus on Locke's conception it is not necessary that an object should belong to the same *kind* throughout its existence. It is at minimum necessary that it belongs to *a* kind throughout its existence, but not necessarily the same kind.

1.4 Sortal concepts and criteria of identity

In Wiggins's definition of his principle **D**, we saw that sortal concepts have an important place in his theory. The sortal dependency thesis claims that there is a sortal concept such that *a* and *b,* of which identity is claimed, fall under this concept. We should therefore not only investigate the associated concept of *kinds*, as we did in 1.3, but also investigate the notion of *sortal concept,* or *sortal*.

The name 'sortal', originates from Locke:

> 'But it being evident, that things are ranked under names into sorts or *species*, only as they agree to certain abstract *ideas*, to which we have annexed those names, the *essence* of each *genus*, or sort, comes to be nothing but that abstract *idea*, which the *general*, or sortal (if I may have leave so to call it from *sort*, as I do general from *genus*,) name stands for. (Locke 1996 [1689], III.iii.15)

Thus for Locke, a sortal name is a name for an abstract idea, that is referring to the nominal essence of the things that fall under the abstract idea.

I already mentioned that Wiggins and Lowe set out to defend a position wherein the levels of semantics and metaphysics are dependent upon each other. How they argue for this will be

[33] This does not imply that they are *arbitrarily* chosen or constructed, but they are constructed from the impressions we have of things represented by the simple ideas of substances. See (Ayers 1991a) for a defense of this point and (Bennett 1971) and (Bennett 1987) for the rival interpretation of Locke.
[34] For a more extensive treatment of the difference between Locke and Aristotle on natural kinds and substance, see (Ayers 1981).
[35] (Locke 1996 [1689], II.xxiii.15).

explained in section 4.2, for now it is important to see that this puts some tension on the concept of 'sortal'. Wiggins and Lowe believe that sortal concepts are supposed to stand for real kinds.[36] Because of this, their use of 'sortal' and 'sortal concept' is somewhat different from Locke's use. Locke introduced 'sortal' as a name for *abstract ideas* of the *nominal essence* of things. Strictly speaking, then, 'sortal' for Locke does not stand for ideas of *real kinds*. I will use 'sortal concept' liberal, standing for concepts of sorts or kinds, either *real* or *nominal.*[37] If I mean to refer to sortal concepts that explicitly stand for concepts of *real essences*, I will use 'substance concept'.[38]

Sortal concepts have criteria of identity associated with them. Criteria of identity are the standard for the identity of instances falling under the term. According to Geach, substantival general terms[39] have these criteria of identity associated with their use as a linguistic fact. On his account, these criteria are linguistic criteria; they are part of the *sense* of a term. They are only hidden, according to Geach, as he says: 'What a sign conceals, its use reveals' (Geach 1962-8/1980, 3rd ed 71). For Lowe and Wiggins the criteria of identity are not just linguistic facts. According to them, the criteria of identity that are associated with a sortal concept are grounded in the *real kinds*.

Frege can be considered to have introduced the concept of 'criterion of identity' in *The Foundations of Arithmetic* when he says:

> If we are to use the symbol a to signify an object, we must have a criterion for deciding in all cases whether b is the same as a, even if it is not always in our power to apply this criterion. (Frege 1953 [1884], 73)

Frege's discussion is about the identity of numbers, but what we are interested in here, is slightly different. We are interested in criteria of identity that are about objects, specifically living things. Lowe suggests the following general form for criteria of identity:

(B): $(\forall x)(\forall y)[(\phi x \,\&\, \phi y) \rightarrow \big((x = y) \leftrightarrow Rxy\big)]$ (Lowe 1989, 6)

In this scheme, ϕ is a sortal term and *R* expresses an equivalence relation between *x* and *y*. The paradigm example of such an criterion of identity is, according to Lowe, the Axiom of Extensionality of set theory, because it tells us when sets are identical, namely when they have the same members (this is the relation R). Similar criteria of identity are supposed to be associated with sortal terms of living things. For the sortal dependency theorist, the *kinds* will help us find the criterion of identity for the things of that kind:

> An answer to the *what is it* question does both less and more than provide that which counts as evidence for or against an identity. It does less because it may not suggest any immediate tests at all. It does more because it provides that which *organizes* the tests or findings. (Wiggins 2001, 60)

The specific criterion of identity for specific kinds of living things may depend on what kind of thing it is. Bacteria will have another criterion for identity then horses, for example. It might even be, as

[36] With an explicit exception for artifact-sortals, but we will leave that aside.
[37] Therefore, general concepts of artifacts, such as 'book' are also sortal concepts.
[38] See Wiggins's principle **D**(iii) and further (Wiggins 2001, 70 - 74) for this use of 'substance concept'.
[39] In my use of 'sortal term', this is the same concept as 'substantival general term'.

Lowe suggests, that eventually for living things there is one equal criteria of identity, associated with the concept or *category* 'organism'.[40]

One not universally accepted aspect of the criteria of identity associated with sortal terms is that they also provide criteria for *counting* the things falling under the concept. This plays an important role in Lowe's rejection of a *bare particular* as a mere individual thing. Wiggins doubts whether a criterion of counting is a necessary condition of a sortal concept[41] and Lowe as well allows some sortal concepts, for example, mass nouns such as 'water', to lack criteria for counting. But giving a principle for counting is, according to Lowe, a *sufficient* condition for a sortal.[42]

There is another point to be made about criteria of identity, related to the discussion about persistence of objects. Criteria of identity are, in the theories of Wiggins and Lowe at least, supposed to provide both criteria of *distinctness*, and criteria of *diachronic* identity.[43] For a criterion of distinctness it is sufficient that it provides us with a criterion for drawing the boundaries of an object at a specific time. For a criterion of diachronic identity, it is also necessary that it provides a criterion for reidentification of the object over time, thus that it also reflects an object's persistence conditions. These criteria reflect identity *over time*, which allows for diachronic identity statements. According to Wiggins, the distinction between diachronic and synchronic identity statements disappears on his theory. Chapter two discusses the distinction and shows that the difference does disappear, but not for the same reasons Wiggins has.

1.5 The sortal dependency thesis of identity and individuation

Let me retrace the important aspects of this chapter concisely. The sortal dependency thesis sets out to establish a theory of individuation that should elucidate *identity*, *persistence*, *substance*, and our capacity for *singling out* things in experience. Though the sortal dependency theory of individuation is at the core of the theory of Wiggins and Lowe, three aspects can be distinguished, based on the discussion of this chapter:

First of all, for individuation metaphysically conceived, the thesis claims that a thing's existence is always *as a this such.* Being an individual thing, what Aristotle called a *primary substance*, is dependent upon being a thing of some nameable kind, Aristotle's *secondary substance.*

Secondly, for individuation epistemologically conceived, the sortal dependency claims that our capacity of *individuating* or *singling out* a thing is dependent upon a sortal concept that determines *what kind of thing it is*, that is singled out.

And thirdly for identity, the thesis claims that identity of a thing is governed by the *kind of thing* it is. Any statement *a* is the same as *b*, is dependent upon the statement that *a* is the same *f* as *b*, where f is a kind.

The following chapter will evaluate the force of the sortal dependency thesis for the latter claim, the specific topic of *identity.* The third chapter discusses *our capacity* of *singling out* things. The third

[40] (Lowe 2009, 27).
[41] See his rejection of thesis **D**(ix) (Wiggins 2001, 75).
[42] See (Lowe 2009, 13).
[43] See (Wiggins 2001, 71), for further discussion and references of temporality and identity, see (Gallois, 2011).

chapter will evaluate the credibility of the sortal dependency thesis for individuation, as the metaphysical thesis of the individuality of objects.

2. The Sortal Dependency Thesis of Identity

The sortal dependency thesis of identity serves two main purposes. In the first place, it should establish an absolutist theory of identity: Leibniz's law is taken to be the core of the notion of identity, and therefore relative identity should be avoided. Its second purpose is to understand the notion of *persistence*, or *identity over time*. It tries to establish the principles of identity over time for objects, such that we can understand *persistence* in terms of identity.

This chapter will start with the challenge of relativism, which threatens our common sense notion of absolute identity that followed from the acceptance of Leibniz's Law. It is argued that the sortal dependency theorist cannot escape these examples without begging the question against the relativist and that we should consider an alternative strategy. It is argued that it is the role of *time* in the arguments for relativism that causes the true problem and it is argued that we can escape this problem by challenging the way the sortal dependency theorist's, and the relativist, treats the role of time in matters of identity.

The sortal dependency theorist claims that the principles of persistence for a substance, or *identity over time*, is determined by the kind of substance it is. It is shown that there is an alternative in which we do not have to assume kind-membership in order to understand identity and persistence. Following Lewis, it is argued that identity is the most simple relation there is: any object is identical to itself and there is never a question as to what makes it identical. The relevant question will be what the notion of 'object' is. It will be argued that there is a notion of 'object' available, namely that an object is a material coherent unity, such that we can both allow identity to be the most simple relation there is, and understand persistence properly without assuming sortal dependency: the sortal dependency for individuation is not necessary for our understanding of both identity and persistence.

2.1 The cases of supposed relative identity

Wiggins and Lowe, as defenders of absolute identity, discuss two central examples of supposed relative identity, the example of Heraclitus and the river, and of Lord Newriche and the herald Bluemantle. These examples are originally formulated by Geach in *Reference and Generality*.[44] Wiggins and Lowe suppose that these two examples are established to provide a counter-example to the absolutist thesis. Recall that the thesis of relative identity is that for at least one pair *a* and *b* the following holds: $((a \overset{=}{}_f b) \wedge \neg(a \overset{=}{}_g b) \wedge (g(a) \vee g(b)))$, wherein f and g are sortal concepts. This section investigates the two examples, and determines what they are supposed to establish.

Both the examples are structurally the same: Geach carries out a reductio ad absurdum on the way Quine treats expressions of the form 'some A', and argues that sentences like 'being the same water' cannot be analyzed as 'being the same something or other, and being water'.

In the first edition of *Reference and Generality,* Geach considers the following example for which Quine's doctrines allow for the following inferences:

[44] (Geach 1962-8/1980).

(1) Heraclitus bathed in some river yesterday and bathed in the same river today.
as equivalent to:
(2) Something (or other) is a river, and Heraclitus bathed in it yesterday, and Heraclitus bathed in it today.
Or, using 'bound variable' letters, as equivalent to:
(3) For some *x*, *x* is a river, and Heraclitus bathed in *x* yesterday and Heraclitus bathed in *x* today.
Now, by parity of reasoning we may analyze:
(4) Heraclitus bathed in some water yesterday, and bathed in the same water today
As equivalent to:
(5) Something (or other) is water, and Heraclitus bathed in it yesterday, and Heraclitus bathed in it today.
Or again to:
(6) For some *x, x* is water, and Heraclitus bathed in *x* yesterday, and Heraclitus bathed in *x* today.[45]

Geach discusses the consequences of this example. Because of an additional, quite plausible premise, 'whatever is a river is water' we can deduce that (5) and (6) follow from (2) and (3) respectively, but the premise 'whatever is a river is water' does not warrant us to go from (1) to (4): sentence (4) is much stronger than (1), because there is the possibility that Heraclitus does bathe in the same river but not in the same water on two consecutive days, because the water is now part of the Aegean sea. Thus we have a counterexample to the transition from (1) to (4). Geach concludes that because 'whatever is a river is water' is true, (1) cannot be analyzed as (2) or (3), and (4) cannot be analyzed (5) and (6). Or, to be more precise, Geach's contention is that we cannot analyze the sentence: 'being the same water' as 'being the same (something or other) and being water': there is no absolute expression 'being the same', only the expression 'being the same *f*'.

According to Wiggins and Lowe, this example establishes a case of relative identity because it allows that Heraclitus bathed in the same *x and* not in the same *x*, for what Heraclitus bathes in on the second day is still the same river, but not the same water as it was on the first day. We thus would have an example of the form $((a \overset{=}{_f} b) \wedge \neg(a \overset{=}{_g} b) \wedge (g(a) \vee g(b))$, where f is *river* and g is *water*. However, this is *not* what Geach tries to establish with the example, he tries to argue *against* the Quinean analysis of sentences like 'some A' in this example, not *for* the thesis of relative identity.

In the third edition of *Reference and Generality,* Geach has replaced the example of Heraclitus and the river with the example of Lord Newriche and the herald Bluemantle. This example is structurally the same. Geach has replaced the river example because he felt that there is an unnecessary difference between the terms 'water' and 'river': 'river' is a count noun, and 'water' as mass term.[46] Geach acknowledges that he does not have a satisfactory account of mass terms, and therefore replaces the example with the following one:

> Let us suppose that the recently ennobled Lord Newriche has been visiting the Heralds' college to consult the herald about his coat of arms. The papers of his case are on the desk of Bluemantle; "Bluemantle" is a name *for* a herald, in official language, and is grammatically a proper noun. If Lord Newriche saw Bluemantle at the Heralds' College on Monday and Tuesday, then on Tuesday it would be true to say:
> (1) Lord Newriche discussed armorial bearings with some herald yesterday and discussed armorial bearings with the same herald again today.
> The Frege-Quine view would treat this as equivalent to:

[45] From (Geach 1962-8/1980, 2nd ed 150-1).
[46] He says this in the third edition of *Reference and Generality*: (Geach 1962-8/1980, 14).

(2) Something (or other) is a herald, and Lord Newriche discussed armorial bearings with it yesterday and discussed armorial bearings with it again today.
Or again, if we use 'bound variable' letters, (1) would come out equivalent to:
(3) For some *x, x* is a herald, and Lord Newriche discussed armorial bearings with *x* yesterday and discussed armorial bearings with *x* again today.
Now by parity of reasoning we may analyze:
(4) Lord Newriche discussed armorial bearings with some man yesterday and discussed armorial bearings with the same man again today
as equivalent to:
(5) Something (or other) is a man, and Lord Newriche discussed armorial bearings with it yesterday and discussed armorial bearings with it again today
or again to:
(6) For some *x, x* is a man, and Lord Newriche discussed armorial bearings with *x y*esterday and discussed armorial bearings with *x* again today.[47]

Structurally this example is the same as the first example of Heraclitus and the river. According to Geach, because of the plausible premise that 'every herald is a man', we again cannot accept the transitions from (1) to (2) and (3) and from (4) to (5) and (6). The counterexample to the transition from (1) to (4) in this example, is the situation where there is a change of personal in the Heralds College. Therefore (1) and (4) are not equivalent. This example thus establishes, analogously to the example from the first edition, that 'the same man' cannot be analyzed as 'the same something or other, which is man'.

According to Wiggins and Lowe, this argument again is supposed to establish relative identity, Lord Newriche in the example sees the same herald, but not the same man, the identity statement is relative under the sortal terms 'herald' and 'man'.

2.2 The sortal dependency against relativism

Wiggins tackles the first example fairly straightforwardly. According to Wiggins, the notion of 'is' in 'whatever is a river is water' employs the 'is' of constitution, not of predication. Therefore there is no sortal concept *g, water,* similar to the sortal concept *river*, but rivers are *constituted by* water. Wiggins concludes that 'same water' is not a covering concept for an identity statement identifying a river with something (again a river):

> Unlike the water, the river on which I moored my boat yesterday is not part of the Aegean. Rivers are indeed water, but this means that water goes to make them up. 'Same water' is not therefore a covering concept for an identity statement identifying a river with something. (Wiggins 2001, 43)

But though this analysis does refute the supposed case of relative identity, it is not a proper argument against the argument Geach actually gives. In order to see this, we should first make it clear what Geach's argument is meant to establish. According to Geach we should conclude that the analyses from (1) to (2) and (3) (and from (4) to (5) and (6)) are fallacious: ""being the same water" cannot be analyzed as "being the same (something or other) and being water" (Geach 1962-8/1980, 2nd ed 151).

Wiggins seems to agree with this point, but implicitly still employs the rejected kind of analysis from (1) to (2) and (3)) (and from (4) to (5) and (6)). In order to see this, we have to revisit the formulation

[47] (Geach 1962-8/1980, 3rd ed 174).

of relative identity. The thesis of relative identity it is supposed to be of the form $((a \overset{=}{_f} b) \wedge \neg(a \overset{=}{_g} b) \wedge (g(a) \vee g(b))$. This formulation of relative identity follows from Wiggins's formal rejection of relative identity, but Wiggins argued for the formal denial of this form under the following assumptions:

> If someone reports further that the thing that runs is the same as the thing that is white, then his judgment cannot be true unless at least two conditions are satisfied. These conditions are that the thing that runs should be the *same something or other* as the thing that is white (…) and that the something in question be correlative with or associated with a principle by which entities of a particular kind may be traced or kept track of and re-identified as one and the same. (Wiggins 2001, 22)

The phrase that 'the thing that runs should be the same *something or other* as the thing that is white' expresses exactly what Geach's argument is intended to deny, namely that I can analyze the sentence 'the thing that runs is white' as 'something or other is the same and is white'.

This also holds for Wiggins's solution to the example of the Bluemantle case, where he employs the same kind of strategy:

> The sentence 'a is the same official as b' doesn't ascribe 'numerical identity' to *a* and *b* at all. It predicates something to them in common, namely holding a certain office. (Wiggins 2001, 44)

It is only acceptable to say that we ascribe 'holding a certain office' to both *a* and *b*, such that '*a* is the same as *b*', if we accept the form 'something or other, which is a, and something or other which is b, are not identical and both hold the office of herald'. But this kind of analysis is exactly what is denied by the example as Geach sets up the argument. Wiggins's solution of the examples of relative identity is therefore question-begging.

The same mistake can be identified in Lowe's treatment of the examples. Within his own theory in which we can logically speak of the 'is' of instantiation, we can interpret the sentences '*a* is a river' and '*a* is water' as instantiation sentences: 'a instantiates a river' and 'a instantiates a water'[48]. Then the premise 'whatever is a river is water' can be reformulated into the sentence 'for any *x*, if *x* instantiates a river, *x* instantiates water'.

According to Lowe, in order for the argument to establish relative identity, 'x is water' and 'x is a river' should be logically isomorphous. This means that any logical inference that can be made with 'is a water' should also be possible with 'is a river'. According to Lowe, this cannot be true because 'water' and 'river' have different criteria of identity: a river is a geographical phenomenon, while water is a chemical substance. Thus in the argument the premise 'whatever is a river is water' is not true and we escape the supposed case of relative identity.

Lowe's argument against in the second example is that 'herald' is not a proper sortal term, while *man* is, and that the identification of *herald* and *man* cannot be made because they do not share the same criteria of identity. According to Lowe, Geach has to argue that the transition from (1) to (2) and the transition from (4) to (5) *stand or fall together*. That is, that either both transitions are allowed, or neither of them. Geach's argument is intended to show that neither are allowed, since with the plausible premise 'whatever is a herald is a man' the transitions lead to absurdity. However, Lowe

[48] 'water' now used as *count noun*.

believes that, as in the Heraclitus example, it is the additional premise that 'whatever is a herald is a man' causes the absurdity and that the transitions are not necessarily both problematic. He then gives the solution of the example, stating that in the case that we accept that 'herald' (or 'water') is not a proper sortal concept for identity statements, we can allow one side of the transitions (from (1) to (3)) and the deductions from (2) and (3) to (5) and (6).

But this solution is not fair to Geach's argument. Geach does not really *assume* that the transition from (1) to (2) and (3) and from (4) to (5) and (6) stand of fall together – this is simply the consequence of the doctrine of Quine at which Geach carries out a *reductio*.

It is interesting, however, that both Wiggins and Lowe accept the conclusion of the examples. They both agree with Geach that we cannot accept the analysis of 'being the same water' as 'something or other is the same, and is water'. According to Wiggins, 'being the same water' expresses 'is also constituted by water', and according to Lowe, it expresses that it 'is the same *kind* of water', not that it is numerically the same water. They thus seem to agree with Geach that for 'being the same water' the Quinean analysis that it expresses 'something or other is the same, and is water' is true.

Thus we conclude that both the supposed refutations by Wiggins and Lowe are not challenging the conclusion of Geach, and have therefore, with their supposed refutations of Geach's examples not yet argued against relativism. They suppose that Geach's examples serve to argue for a case of relative identity, but that is not what they are intended to establish. But what then, is the true point of dispute here with regard to the thesis of *relative identity*? In the next two sections I argue that the problem of the relativity of identity comes into play when identity is claimed *over time*, such that it is supposed to imply that the identity over time, or the *persistence* of an object implies sameness of *kind membership.*

2.3 Identity and time

The discussion of identity of the preceding sections seems to revolve around two aspects: the temporality of identity and the status of the sortal concepts that govern the identity relation. The examples of supposed relative identity are always examples that involve *diachronic* identity, and always an important difference in the criteria of identity between the sortal concepts of the things that the identity statements are about. In the discussion above, we have seen problems concerning diachronic identity statements that might seem to make Lewis's statement about identity somewhat oversimplified:

> More important, we should not suppose that we have here any problem about *identity*. We never have. Identity is utterly simple and unproblematic. Everything is identical to itself; nothing is ever identical to anything except itself. There is never any problem about what makes something identical to itself; nothing can ever fail to be. (Lewis 1986, 192-3)

However, is it really too naïve to say this? If we deny identity to be dependent upon kinds, and claim that identity is only the simple relation Lewis holds it to be, it is still possible to be absolutist without assuming sortal dependency.

According to Lewis, many problems we phrase like an identity problem can be rephrased in such a way that they do no longer involve identity.

> Is it ever so that an F is identical to a G? That is, is it ever so that the same thing is an F and also a G? More simply, is it ever so that an F is a G? The identity drops out. Thus it is a good question whether a river is something you can bathe in twice (…) All of these questions could be stated in terms of identity – harmlessly, unless that way of stating the question confuses about where to seek for answers. (Lewis 1986, 193)

If this is true, then we need an answer to the question what exactly the difference is between proper identity statements and only apparent identity statements that should be rephrased so that the identity drops out. My suggestion is that the division is made with the temporal aspect of diachronic identity statements. Synchronic identity statements are not problematic as such – either the names *a* and *b* stand for the same object, or not. This is not really problematic. But in the case of diachronic identity statements matters are not that simple. But in which way do diachronic identity statements claim *identity over time?*

Let us look at Quine's solution to the Heraclitus example of the river and water. According to Quine, the solution is fairly simple: one can step into the same *river* at two different moments, but not in the same *river stage.*[49] This solution saves the extensional character of identity, at the cost of introducing the concept of 'river stage'. But this is fairly unproblematic: a river can easily be regarded as a process through time, while its momentary intervals are, in a trivial sense, stages of that process. All we need to do, in order to find out whether what we name 'a' and 'b' are identical, is to consider whether 'a' and 'b' have the same temporal and spatial reference. The temporality, in this solution, is placed outside of the relation of identity, and the concept 'river' only determines the reference of *a* and *b,* not the identity relation itself.

This also works for the Bluemantle example: Lord Newriche spoke with the same *herald* at two different moments, but not with the same herald *stages*. One can, of course, speak twice with the same man that is the herald in a both cases, but that is because then the identity is about the man, not the herald.

What happens with diachronic identity on this solution of the example? The temporality is taken out of the identity statements, into the objects of which identity is claimed, and diachronic identity turns out as simple as synchronic identity. What is left untreated is the notion of 'persistence', which underlies diachronic identity statements. How do we have to think of the persistence of an object in relation to its identity? Doesn't 'persistence' mean that the persisting object remains the same object over time? The answer is 'yes', but not in the same way that the sortal dependency theorist claims. This will be discussed in the following section.

2.4 Persistence, identity and time

What becomes clear in the discussion of relative identity is that all the examples involve a qualification *in time*. For the sortal dependency thesis, absolute identity entails that a substance cannot lose its *real kind* over time.[50] Once a thing is a specific *this such*, it's *that such* for life – losing its real kind means ceasing to exist. The temporal determinateness of being *of a kind* is assumed. And this is where the metaphysical dispute comes in: the statement that an individual cannot lose its kind

[49] See his (Quine 1953, 65).

[50] Lowe allows for the exception in which an object might change its real kind over time, as long as two the real kinds have the same criterion of identity (Lowe 2009, 16).

is a metaphysical thesis, but from that perspective, it is not clear what it has to do with identity simpliciter.

Why do Lowe and Wiggins hold that the essentialist idea that objects cannot lose their kind-membership is important for identity and persistence? Can we find proper arguments for it? The reidentification of objects *over time* seems to be crucial here. Lowe and Wiggins believe that diachronic identity statements of an object, stating that the cat at my door this afternoon is *the same* cat that I fed this morning, imply *sameness of its kind:* persistence implies remaining the same *kind* of thing. However, why could we not deny reidentification sentences to imply sameness of kind? The Lewisean solution is that in saying that *a,* at time t_1 is *identical* to *b* at t_2 one expresses that *a* and *b* stand for the same object that extends through time, at least from t_1, to t_2. Then identity turns out to be a simple straightforward relation that an entity has only with itself. This avoids the conclusion of the Geachean examples that Leibniz's law does not hold, and that thereby identity is not only sortal *dependent*, but immediately sortal *relative.* On this view of identity, statements of the form 'is the same f' are not about identity – not about *coincidence*: identity is not a relation of things *as being a river,* or a herald or something else, it is a relation of things with themselves.

It was the category of diachronic identity statements that gave rise to the problem relative identity. I think we have now seen strong reasons to believe that these statements are often not truly identity statements as such. Following Lewis, I propose that there is another question that lies at the root of many diachronic identity statement, namely the question of whether a proper object can 'lose a kind', or phrased positively, whether a thing is a member of its kind life. In many cases it will be, but that is not a question with regard to *identity*, but with regard to the question of what an object is. Stating that 'John is the *same man* as the boy on this picture', says that becoming a man did not change what John is, a human being, not that he didn't change at all, that is, not that he is still *identical* to the boy. Thus the right question for this diachronic identity statement is not one of identity, the identity drops out. Of course we can also say that 'John is identical to the boy on the picture', then the identity will not drop out, but it doesn't have to: in this case 'John' and 'the boy', stand for the same thing that persisted through time, at least from the picture to now: John. And surely, John is identical to himself because anything is.

There are two things that are needed, in order to make this a successful strategy for avoiding relativism. On the one hand, a way to speak of persistence, that still entails *sameness*, but not *sameness of kind-membership*. And on the other, a notion of 'object' that enables us to speak of persistence of the object, without having to speak of the kind under which the object falls. I think that we have such a notion of object: an object is a material unity. I will postpone the defense of this notion to chapter five, for a large part of the defense will be much simpler once we have seen the problems the sortal dependency of individuation has with biological objects in chapter four.

'Persistence' seems to express 'remaining the same object through time', and the way things are presented now, this seems to be lost. If we treat objects that are identical as objects that are stretched *over time*, we seem to be not so much speaking of *persistence* of that object. But with the conception of 'object' as a material coherent unity, we can treat persistence from another angle. Being a material coherent unity is always a process in time – coherency of matter does not take place at a single point in time. We could say that a stone is materially coherent, but if within an instant the stone perishes, we would not say that it was materially coherent. Material coherency supposes a

process over time. Hence we get 'persistence' for free if we accept material coherency: being materially coherent implies existence over time. Again, the defense for this notion of 'object' will be carried out in chapter five, for the purpose of this chapter it is enough to see that we are not necessarily committed to accept sortal dependency of identity to properly understand *identity* of objects, both at a time and through time.

2.5 Identity and sortal dependency

This chapter discussed the threat of relative identity and argued that the defenders of the sortal dependency thesis did not argue against the true problem that lies at the root of relative identity: the problem of identity *over time*. As alternative it was shown that if we regard *identity* as the most simple relation any object has with itself, we avoid the threat of relative identity because the temporal aspect of *diachronic identity* on this account is taken outside of the identity, into the objects themselves. For *persistence* it was argued, we do not have to hold that persistence implies sameness of *kind membership*. If we regard an object as a materially coherent unity, we can understand *persistence* as the existence of that materially coherent unity through time: being a materially coherent unity, an object, *means* existing over time.

This completes the first step in our argumentation against the sortal dependency thesis: sortal dependency is not necessary for avoiding relative identity and understanding identity and persistence. We can now turn to the second aspect of the sortal dependency thesis: the thesis that our capacity of singling out objects in experience is sortal dependent.

3 Singling out objects in experience

3.1 Sortal dependency and singling out

Now that we have seen the way out of the sortal dependency for identity, we can turn to the second thesis of sortal dependency: the sortal dependency of singling out objects in experience. The thesis of sortal dependency for individuation, epistemologically conceived, is that our capacity to single out objects in experience is dependent upon the sortal concepts we use. As Wiggins says:

> In due course, we shall discover reason to think that there could be no singling out *tout court* unless there could also be singling out *as.* (This is not a priority claim). (…) It will be a consequence of the account of these matters to be given here that, for a thinker to single out or individuate a substance, there needs to be something about what he does, (…) which sufficiently approximates this: the thinker's singling out *x* as an *x and* as a thing of kind f such that membership in f entails some correct answer to the question 'what is *x*?' (Wiggins 2001, 7)

So *singling out* an object in experience entails that there is some correct answer to the question 'what is it?', according to Wiggins. It is a bit unclear when something 'sufficiently approximates' that there is a correct answer to the 'what is it?' question. For Wiggins, it are sortal concepts that do the work here: singling out an object is done successfully if there is some accompanying sortal concept under which what is singled out falls.

In Lowe's treatment of sortal dependency we can find similar remarks. For example:

> We cannot, with Locke, simply suppose that the mind somehow constructs certain 'abstract general ideas' from its experience of concrete particulars and then proceeds to classify all such particulars by reference to these ideas alone: for particulars cannot even be experienced as *being particulars,* without being experienced as particulars *of some sort.* (Lowe 2009, 16)

According to Lowe, we have to experience particulars as particulars of some sort, in order to perceive them as particulars at all. This is much stronger than what Wiggins claims, because for Wiggins it is sufficient that there is something in what a perceiver does, that entails an answer to the question 'what is *x*?'.

3.2 Experience, objects and sortal concepts

Both the accounts, of Wiggins and Lowe are problematic to serve as explanation of our capacity to single out objects. How do sortal concepts help in correctly singling out an object? It is clearly too demanding to claim that one has the right sortal concept in order to individuate an object of that sort. Wiggins agrees with that, and says that in order to individuate something, we need not have a fully true conception of what it is we are individuating, all we need is that we have our conception right in some minimal respect. Thus in order to individuate, say, a tiger, we only need some conception that at least coincides at one aspect with the proper sortal concept 'tiger'.[51] This could perhaps be 'has four paws' or something similar. This suggestion however is highly problematic. Campbell already noticed this, in his argumentation against the sortal dependency thesis.[52] Campbell rightly argues that the idea of 'approximation' of our conceptions to the concepts is problematic,

[51] See (Wiggins 2001, 150)
[52] (Campbell 2002, chapter 4, 68-75).

because I can make quite exceptional mistakes and still successfully individuate something. In his example someone thinks he is looking at a plastic plant, while in fact it is a real plant. The question is then whether it is a better or worse approximation to think that it is a real plant? Besides this unclarity of 'approximation' Campbell believes that it is a theorist's fiction to say that 'approximating towards the sortal classification' is what must be happening in the case of individuating a teacup. Over generations, people might become less accurate in their view on what sort of things teacups are. Nonetheless they will single them out just as determinately as we do now. Wiggins might argue twofold. On the one hand, he could argue that this example is not appropriate since it involves artefacts, and artefacts have nominal essences. Hence it will not really be problematic, as long as we do individuate the same sort of stuff or something. That this aggregate of stuff forms a cup is more like a convention than something within the cup itself. There is a second way in which Wiggins might answer, namely by referring to Putnam's socio-linguistic hypothesis of the division of linguistic labour.[53] Then as long as there are experts who are able to answer whether this thing is an actual cup or not, it is not a true problem that we might over time use less clear concepts. The consequence of this latter argumentation strategy is that you have to deny that the later generations still individuate the teacup as well as foregoing generations. Campbell's third argument against Wiggins's solution to the problem is, as he rightly sees, the most fundamental one. He says:

> If you are making a mistake in your classification of the object, how can that mistake be what allows you to single out the object? Surely you must be singling out the object despite your mistake, rather than because of it. (Campbell 2002, 73)

And this is spot on against Wiggins's approximation solution. It is on his suggestion possible, that by making a mistake, in using a completely inapt sortal for individuation, I might end up singling out something, correctly, with a complete erroneous sortal concept that has by some coincidence one aspect correct. For example, I might try to single out a horse but believe that horses are fish. By mistake I believe that fish have four legs and walk through meadows. With Wiggins's suggestion, it is *because of that mistake* that I can single out the horses in the meadow. Wiggins faces a problem here.

3.3 Categorialism

With regard to Lowe's version, that we cannot perceive particulars if not perceived as *particulars of some sort*, there are similar problems. If Lowe's thesis is meant to entail that for *perception* we need to perceive particulars as particulars of some sort, it seems to require an implausible capacity of the human mind. Again we can turn to Campbell to see that this is problematic. Campbell argues that the demands of the sortal dependency require an implausible capacity of conscious attention. Campbell shows that in order to consciously attend to something, we are in need of far less demanding capacities than the application of a sortal concept of what we are seeing. The visual system binds together features over time, which is much more primitive than sortal conceptualization: it only needs mechanisms of binding. And, recalling the argumentation strategy against Wiggins's demands for individuation, it is clear that we can single out something without the slightest idea of what it is, often even with a completely false idea of what it is. Conscious attention to an object is therefore, according to Campbell, much less demanding than application of a sortal concept.

[53] This is the thesis that in a linguistic community experts will determine the extension of some of the terms of the community, as happens for example in the case of 'gold'. See (Putnam 1975b). The theory of Putnam will be discussed to a larger extent in chapter four.

Lowe has seen this threat from Campbell and agrees with it to such an extent that he makes a distinction to rescue his theory. In his article on individuation, Lowe remarks in a footnote[54] that Campbell's arguments, which are directed at the 'delineation thesis', are not directed at the most attractive and defendable core of the sortal dependency thesis. Campbell defines the delineation thesis as follows:

> Conscious attention to an object has to be focused by the use of a sortal concept which delineates the boundaries of the object you are attending. (Campbell 2002, 69)

According to Lowe, what is interesting and defensible about the sortal dependency thesis is not this aspect of conscious attention, but a variant of it, which he calls 'categorialism': we have to categorize what we see in some primary category, the most general category that an object falls under, such as 'living organism':

> Thus, while I am happy to allow that a thinker can successfully single out a material object in thought without conceiving of it as belonging to some quite specific *sort* or *kind*, such as the kind *cat*, or the kind *table* , or the kind *mountain*, I consider that he must grasp, at least implicitly, to what *ontological category* the object in question belongs — such as *living organism*, or *material artefact*, or *geological formation*. This is not at all to imply, of course, that the thinker need be able to have a linguistic command of such categorial terms as these, only that he ha[s] at least an implicit grasp of the relevant *criteria of identity and principles of individuation*. For without such a grasp the thinker cannot really be said to know *what it is* that he is, supposedly, thinking about. And without knowing that, he cannot really be said to have singled out an object in thought. (Lowe 2007, 525)

The category is the ultimate sortal term, in that it is the last generalization over individuals that will still provide criteria of identity. He even suggests that these categories might somehow be a-priori categories of thought. He will thus not say that we have to see particulars and think of them as being of a particular very specific *sort*, but as, for example, being *a living thing,* or a *geographical thing.*

However, I contest whether this is a plausible conception of our capacity of singling out objects in experience. I do not have to *know*, or even *implicitly know*, *what it* is in order to be able to single an object out in experience. Consider, for example, that we encounter on some coral reef some object, and we think that it is a rock. Then I have singled it out *as a rock*. But at further investigation, it turns out to be a living organism. I did not *know* not even *implicitly*, that it is an organism. And I did single it out in experience. I think it is implausible to say that in the example I did not really singled out anything and hence it is possible to make mistakes in about the categories objects I encounter fall under. Hence, even if we grant Lowe this theory of categorialism, he still faces the objection put forth earlier: it is unclear how we should account for faults. I can have misunderstandings of categories of being, how can I still individuate these things then? So this is only Wiggins's solution that *we have to have at least some aspect right* in disguise, and as I already argued against Wiggins's solution this is a mistaken strategy: it will not save the sortal dependency thesis for singling out.

But besides the fact that it is unclear how we should account for faults in sortalization and categorization, I think it is even simply too demanding to claim that we have to single out an object under a certain category. Recall Quine's insight about the spatiotemporal determination of objects of ostension (section 1.2.4). He rightly saw that the role of a concept when someone points to an object

[54] (Lowe 2007, note 2)

is to disambiguate the spatiotemporal determination of the ostension. And this is the same role that concepts have to play in our capacity for singling out an object in experience. We can single out an object, and think about the objects of experience, as soon as it is determinate what the *spatiotemporal* aspects of the object are. This, however, is far less demanding than Lowe's categorialism: I do not have to *know* what the object is, in order to know its spatiotemporal boundaries. Let us consider the process of counting. In order to be able to count objects, it will surely be necessary to single out the objects that are counted. But what we really need in order to determine for example the number of objects one the table, is the spatial requirements of the objects that have to be counted. It is determinate what the amount of objects on the table is, as soon as it is determinate what size of objects we are required to count, not what *kind* of objects. And even if our visual system does not deliver the spatiotemporal boundaries of objects, concepts would only serve to take that role. So I can properly single out objects without categorizing it under the appropriate sortal or category. Hence the sortal dependency thesis, even in its weakened form of *categorialism* is too demanding.

3.4 Sortal dependency and objects of experience

This chapter argued that the sortal dependency thesis for singling out objects in experience is far too demanding. The suggestion that we do not have to have the correct sortal concept in order to single out an object was argued to be problematic because it does not properly deal with the possibility of mistakes. We saw that what is important for our capacity of singling out objects is that there is some mechanism of binding in experience, which is far less demanding than sortal classification (or categorialization). This implies that it is in principle possible to single out and investigate things presented in experience without having to know that *kind* of thing it is. This concludes the second step in our argumentation against the sortal dependency thesis: the thesis that our capacity to single out objects in experience is sortal dependent is an implausible thesis.

4 Individuation and Kinds

Now that we have seen that for both identity sortal dependency is not necessary in order to avoid the thesis of relative identity and to understand *persistence* of objects, and that for our capacity to single out objects the sortal dependency thesis is not a tenable thesis, we are able to turn to the core of the sortal dependency thesis: the sortal dependency thesis for individuation.

This chapter will carry out a criticism of the sortal dependency thesis for individuation from two angles. First it will be argued that the conception of 'kinds' that is required by the sortal dependency is not present in biological practice. There are several possible conceptions of 'natural kind' that might suffice for the sortal dependency thesis. Wiggins's conceptual realism, Lowe's universal realism, Boulter's concept of developmental program and Wilson's conception of kinds as patterns are considered and criticized in section 4.2. In section 4.3 it will be argued that biological practice does not use a concept of 'natural kind' with the characteristics the required for the sortal dependency theory. In section 4.4 it is argued that the sortal dependency is inapt to treat the individuality of hybrids, chimeric individuals and micro-organisms. That conclusion will be extended towards artificial individuals and kinds that result from the processes of genetic manipulation, cultivation and grafting in section 4.5.

4.1 Sortal dependency of individuation

What is individuation? We saw in chapter three that in one sense, individuation is our capacity to single out an object in experience. But before one can single out an object in experience, there has to *be* an object that is such that in can be singled out. We can wonder by what principle some material content is a specific object: what makes that an object *is what it is*?

> But in a quite different sense — which I shall call the metaphysical sense — individuation has nothing to do with cognition or thinkers, but is simply a certain kind of metaphysical determination relation between entities. In this sense, an entity — or, more specifically for present purposes, an object — is individuated by one or more other entities, its individuator or individuators. An object's individuators, in this metaphysical sense, are the entities that determine which object it is. (Lowe 2007, 521)

Individuation, in its metaphysical sense, is the principle that determines *what object it is*.[55] And the sortal dependency thesis says that the individuative principle for an object is the kind to which it belongs: a cat is what it is, a cat, because it is member of the natural kind *cats*.

What is necessary for natural kinds in order to be able to serve the purpose of being an individuative principle? Recall Wiggins's definition **D**ii: $\forall x \exists g \forall t[(x\ exists\ at\ t) \rightarrow (g(x)\ at\ t)]$ [56] where g is a sortal. Which says that for any object, if that object exists, it exists as falling under a sortal concept *g* throughout its existence*:* as a thing of a certain essential kind. What conception of 'kind' is meant here? What is the *g*-predicate supposed to express? According to Wiggins, it is supposed to express

[55] Lowe uses 'entity' rather than 'principle'. This is because Lowe believes that *kinds* are real entities and that these real kinds are the *individuators* of objects. The following chapter should make clear why I do not agree with this, and why I think that 'principle' is more appropriate.
[56] (Wiggins 2001, 64).

'what *x is*, in the Aristotelean sense'.[57] Thus, it is supposed to express its *real essence*. The concept of 'natural kind' which is necessary for the **D** principles, is thus a concept that expresses *real essences*. What is the essence? It is, according to Wiggins, the *principle of activity* of the individuals that fall under the concept:

> **D**(v): f is a substance-concept only if f determines either a principle of *activity*, a principle of *functioning* or a principle of *operation* for members of its extension. (Wiggins 2001, 72)[58]

The principle of activity explains what the exemplars of the kind *do and are*, what life-cycles they have etc. Thus the essence of individual things is what mode of activity they exemplify.

The same holds for Lowe's theory. According to Lowe, individuals and kinds are mutually dependent upon each other:

> Individuals are necessarily individuals *of a kind*, and kinds are necessarily kind of *individuals* (Lowe 2009, 5)

According to Lowe an object necessarily *instantiates* a kind, and a natural kind is, on Lowe's conception, an existing universal subject to natural laws.[59] The kind, or universal, which is instantiated by an individual, determines *which object it is*. It determines which properties it, at least dispositionally, possesses and what laws the individual is subject to.

The consequence of both the theories of Wiggins and Lowe, is that for any individual of which we can say that it exists and persists, it has to be determinable *what kind of thing it is.*[60] It has to be determinate what its *mode of activity* is, on Wiggins's term, or which real kind it instantiates, on Lowe's theory. The sortal dependency thesis needs a conception of 'natural kind' that does not allow for vagueness as to whether some individual belongs to that kind or not[61], otherwise it is also not determinate whether the object persists or not. The following sections challenge this conception of 'natural kinds', and the intelligibility of the sortal dependency for individuation.

4.2 Natural kinds

It had long been thought that natural kinds were, in their essential characteristics, unchangeable.[62] At that point, there was an equation between (unchanging) natural kinds and biological species. But with the development of modern biology, Aristotelean conception of unchanging natural kinds was no longer tenable. The task for Neo-Aristoteleans, then, is to find a conception of natural kinds that lifts the tension between the changing character of species and the static character of Aristotelean kinds. The Neo-Aristotelean has to regain some of the characteristics of what Mayr calls the

[57] See **D** as quoted in section 1.1.
[58] Recall that 'substance concept' is a subclass of 'sortal concept', in that substance concepts are about *real kinds*, in Wiggins's theory even the *real, existing, concepts.*
[59] I will discuss Lowe's specific concept of natural kinds in 4.2.2
[60] Determinable *in principle:* not necessarily determinable in the sense that we are actually capable of finding its true kind.
[61] It might be vague *for us,* but there should be a determinate answer at least *in principle* possible.
[62] See (Hacking 1991) for a nice historical treatment of accounts of natural kinds from Mill to Putnam, and (Ayers 1981) for a treatment of natural kinds in Aristotle and Locke.

'typological species concept'[63]: the idea that a species is a set of individuals distinguished by their typical characteristics.

4.2.1 Wiggins's conceptual realism

Wiggins tries to establish the essentialism for the individual substances with Putnam's theory of natural kind terms.[64] The Putnamian account on natural kind-terms says, famously, that a natural kind-term is about the theory of some *good exemplars* of the kind. These good exemplars determine the extension of the kind-term, according to Putnam. In his articles, Putnam concentrates more (though not exclusively) on chemical kinds and their chemical constitution (such as water as H_2O), However, Wiggins proposes an adaption, or better a reinterpretation, to a common interpretation of Putnam's theory:

> It is fully compatible with Putnam's suggestion (…) that the theoretical description that comes into question in a given case should make reference to both the microphysical and the macro-physical. (Some of the useful theoretical notions in this area, *gene-pool* for instance, really make reference to both). (Wiggins 2001, 80)

Putnam's theory of reference makes it possible to link up our concepts with the way the world is structured, even though within a kind there are many differences:

> All the doctrine [Putnam's account of natural kinds] implies is that the determination of a natural kind stands or falls with the existence of lawlike principles, known or unknown, that will collect together the extension of the kind around two or three good representatives of the kind. (…) To be something of that kind *is* to exemplify the distinctive mode of activity that they determine. (Wiggins 2001, 80)

This makes it possible to speak of stereotypes which can be investigated and with reference to which other individuals in a kind can be understood as well. However, this is not all that is needed to establish the conceptualist realism Wiggins wants to argue for. Wiggins believes that Frege's notion of a concept is necessary as well. He argues that Frege's theory of concepts and Putnam's theory of names can cohere.[65]

In his essay in honor of Frege's theory of sense and reference[66] Wiggins carries out the argument for the coherence of the two theories of Frege and Putnam. The attempt to argue for the coherence starts with problems as Wiggins recognizes the theory of natural kinds Putnam faces: 'the problems of underdetermination of meaning by deixis and problems of the proper representativeness of specimens'.[67] From this, he concludes (and rightly so) that the theory of natural kinds needs room for the decisions that certain exemplars pointed to are, for example, members of a sub-species instead of a proper species, and other similar indeterminacies. In other words, the world should have influence as well in determining the proper extension of kind-terms. According to Putnam, this is what we find by scientific investigations. In the case of 'water', for example, scientists have discovered that the chemical structure of water is H_2O, thus they discovered that the true extension

[63] (Mayr 2004, chapter 10).
[64] See (Putnam 1975a) and (Putnam 1975b).
[65] (Wiggins 1995).
[66] For Frege's original paper, see (Frege 1952 [1892]).
[67] (Wiggins 1995, 62).

of the term 'water' is H_2O. Putnam's suggestion is that anything that then bears the appropriate relation to what was named 'water', is also water:

> My 'ostensive definition' of water has the following presupposition: that the body of liquid I am pointing to bears the sameness relation (say *x is the same liquid as y,* or *x is the same$_L$ as y*) to most of the stuff I and other speakers in my linguistic community have on other occasions called 'water'. (Putnam 1975b, 225)

This relation, *same$_L$* in the case of water, is an investigable property of water in the world. And the same is supposed to hold for natural kind terms or biological kinds. Thus for tigers, there should be a *same$_A$,* a same-animal, relation.

The second step Wiggins takes in order to argue for the coherence between Frege and Putnam is to establish that in Frege, a properly possessed conception of an object fixes which object is the object in question. As Wiggins says:

> You can say if you like that what Frege means by the sense of a name is a certain sort of conception of what the name stands for. (Wiggins 1995, 66)

The third and crucial step, then, is to argue that the same holds for the semantical category of concepts in Frege. Then grasping a predicate is grasping the mode of presentation of the concept it stands for. This entails, according to Wiggins, that there can be different conceptions of what, for example, the concept horse is: we could have two ways of present the same: *horse* or *Equus Caballus*. At that point Wiggins feels free to conclude that these ways of presenting the same thing, are at the level of what Putnam calls the 'stereotype'. Then the stereotype is our *conception*, the level of sense, and the *concept* is at the level of the reference. Since in the case of Putnam's theory regarding natural kind terms as 'lemon' or 'tiger', grasping the meaning of the word is not at the level of the stereotype but at the level of the extension, the natural kind-terms properly understood involve extension directly, even in Frege's scheme of sense and reference. This establishes that substance concepts, like 'tiger' or 'cat', are also at the level of extension: they are real concepts which we carve out by investigating individual tigers or cats.

However, it is questionable whether this is a tenable conception of natural kinds. Dupré, in his *The Disorder of Things*, argues against the essentialism that results from Putnams theory of natural kind-terms. According to Dupré, [68] firstly, the experts will not be able to deliver the task Putnam's socio-linguistic hypothesis of the division of linguistic labor suggests. And secondly, the 'same$_X$'[69] relation required for the hypothesis, and for the moderate essentialism that results, does not exist according to Dupré.

Dupré argues that the meaning of the terms of competent speakers, though they often do *resemble* some of the taxonomic structures, are not as the fine-grained as the scientific concepts of species. It is impossible for experts to decide the extension of terms such as 'duck' since it covers too many natural kinds, or species. He says that 'terms of ordinary language have a small chance of referring to cladistically acceptable taxa'.[70] This is because our ordinary concepts originate from morphological

[68] (Dupré 1993, 22-34).
[69] I will use same$_X$, where 'X' is a variable for the 'L' in 'same$_L$' as the name for the sameness relation of water.
[70] (Dupré 1993, 33). Cladistics is the method of classification based on common ancestry (resulting in a tree-branch structure).

rather than phylogenetic knowledge. And thus Dupré believes that it is not possible for experts to deliver the extension of ordinary kind terms.

But this is on itself not strong enough as an argument against Putnam's theory of natural kind terms, since on Putnam's account, it would then be the task of experts to improve upon these ordinary language terms. Dupré's argument seems to fail to appreciate the force of the externalist consequences of Putnam's theory. Even though we, as ordinary speakers, do not know that we cover several natural kinds with one term, there is according to the theory, an answer to the question as to which one we actually do mean with the natural kind term. In the case of 'duck', the experts will look at good exemplars of what we call 'duck', and if it turns out that there are two different kinds of ducks, they can suggest an adaptation in terms and say that we use (and used) the natural kind term wrongly in many cases.

In his second argument Dupré brings forth what is missing in the first argument. Dupré shows that there is simply no conception of 'species' that supports the '$same_X$' relation as in the example of 'water' of Putnam's famous twin-earth example. Biological classification, the practice of taxonomy, does not use a concept of species as Putnam assumes. Dupré forcefully argues that the distinctions that are made in scientific taxonomy have a pragmatic and anthropocentric character. The classification will not be made because the organisms force the experts to make some non-arbitrary distinctions, but because some aspects are of interests to us and some are not. This is a problem for the Putnamian account of natural kind terms, for if there are indeed no other then just anthropocentric choices, then at least the scientific practice does not indicate that there is the required essentialist ground. I show in section 4.3, that Dupré is right in his criticism of Putnam's account.

4.2.2 Kinds as patterns

Because it is problematic to argue for the essentialism of Putnam's theory, Wilson argues that we should regard kinds not as classes that revolve around good exemplars in Putnam's way, but as patterns in nature.[71] This way of regarding kinds, according to Wilson, saves the virtues of Putnam's account, but avoids its problems. For his theory on patterns, Wilson turns to Daniel Dennett's theory of Real Patterns.[72] A pattern, according to Dennett, is a description of material that is more efficient than just presenting the bitmap of the material.[73] Natural kinds are patterns according to Wilson, that is, it gives rise to a more efficient description[74] of the material: the individuals and their properties:

> We treat some of the patterns we discover as natural kinds. What distinguishes the patterns identified as natural kinds from other patterns? A natural kind is shorthand for a complete description of the particular properties of a particular object or process. (Wilson 1999, 43)

The more efficient description contains an amount of information of properties of groups of individuals that can be used to predict and explain behavior of specific individuals of that group. The

[71] (Wilson 1999).
[72] (Dennett 1991).
[73] Dennett originally uses the metaphor of the *game of life*, hence the phrase 'bitmap'.
[74] *Being more efficient* is a very minimal requirement. As soon as for example some property occurs twice and I state the iteration of the property instead of simply stating the two properties twice as well, my description is more efficient.

choice, however, of which description we take is not entirely up to us, according to Wilson. Some descriptions, such as 'animal that would fit through a nine-inch hoop' (Wilson 1999, 43), are mainly determined by our pragmatic interests, but many are not dependent upon us. The explanatory power of the patterns guides us to the real patterns. We can use the pattern descriptions of kinds to predict and explain behavior of individual biological organisms by using the pattern-description. According to Wilson, neither the pragmatic nor the explanatory aspects of our pattern descriptions are truly free: they have to exploit existing patterns, and hence they reflect true kinds, so even though there are inevitable human interests involved, our answers are bound to natural events and things.

According to Wilson, this theory saves the interesting aspects of Putnam's theory of natural kinds: kinds support modal explanation, and allow for empirical investigation and revision of out concepts of specific natural kinds. But it is not committed to the idea that we have to have proper representatives of a kind from which we start our investigations. And thereby this theory does not have to assume for some ground for the sameness relation, as the $same_L$ relation that is required for determining the extension of 'water'. On Wilsons account, kind membership depends on whether the individual falls under the description of a pattern, not whether it has some essential property in common with other individuals. Essential properties come in, on this account, only when the 'identified kind marks the persistence conditions for individuals picked out by that kind'.[75]

The result of this theory is, as Wilson acknowledges, a form of ontological pluralism:

> Because my theory of biological individuality involves several different but overlapping substantial kinds of living entity in its ontology, the view I take on natural kinds must be compatible with a certain kind of ontological pluralism. (Wilson 1999, 46)

According to Wilson, this is compatible with real substantial kinds and real individuals identified by these kinds. However, I do challenge whether it is strong enough to really establish both the sortal dependency thesis for individuation and identity and the metaphysical thesis that everything that is, it a this such. The sortal dependency thesis for identity and individuation on this account of kinds, is only rescued if there is a determinate answer to the question 'what is it', for any individual. We saw, however, that Wiggins and Lowe do not only want to defend sortal dependency, but also absolutism of identity. On the pluralist account, however, relativism seems to be inevitable: individuals can be identical according to one pattern-description, but denied to be identical under another. The only way out is be to say that eventually, one of the two rivaling pattern descriptions is right, or more correct, of the individual. But then it is not really pluralism anymore and this is explicitly denied by Wilson.

I reject the suggestion that Dennett's account of pattern can even establish the idea that there ultimately is a unique answer to the question 'what is it'. Dennett, in the same article, says that all pattern-descriptions are real, if they are more efficient than just stating all the information in a bitmap:

> A pattern exists in some data-is real-if there is a description of the data that is more efficient than the bit map, whether or not anyone can concoct it (Dennett 1991)

[75] (Wilson 1999, 46).

For the reality of a pattern the only criteria we have is *efficiency:* if a description is more efficient than just stating all facts in a large conjunction, it is a real pattern in Dennett's theory. We are in need an additional reason to regard one pattern-description as better, or more real, than another. Wilson suggests that the criteria of persistence for the picked-out individuals were marks of natural kinds. But then we cannot escape the pluralism described above. This is already reflected in the nature of a pattern, because a pattern description always involves noise, and the choice for a pattern with a certain noise ratio is, as Dennett recognizes, a matter of pragmatics:

> Would we prefer an extremely compact pattern description with a high noise ratio or a less compact pattern description with a lower noise ratio? Our decision may depend on how swiftly and reliably we can discern the simple pattern, how dangerous errors are, how much of our resources we can afford to allocate to detection and calculation. These "design decisions" are typically not left to us to make by individual and deliberate choices; they are incorporated into the design of our sense organs by genetic evolution, and into our culture by cultural evolution. (Dennett 1991, 36)

The noise of patterns will also occur in the case of descriptions of individuals and the natural kind-patterns, and it is not clear, without already assuming the reality of some special kinds, how this establishes the ontology of natural kinds Wilson wants. He seems to want what Dennett calls a Realism of kinds with a capital **R**, which is not supported by the patterns-realism. Thus, this theory cannot accommodate the needs for Wiggins and Lowe on the matters of identity and individuation, and it fails to establish the strong metaphysical thesis of sortal dependency of individuation.

Wilson himself does advance an argument for sortal essentialism.[76] He argues that when a living individual necessarily has its actual biological origins, it necessarily belongs to a biological real kind and that therefore we can make valid arguments from kind-membership to individuals and their properties. This eventually is supposed to establish the metaphysical thesis that individuals cannot lose their kind-membership without ceasing to exist, which was the central aspect of disagreement between the relativist and absolutist concerning identity. I do question whether the account of natural kinds as put forth by Wilson is strong enough to establish this thesis.

Whether a pattern is there or not, depends on whether there are facts[77] that are exploitable for the pattern description. These patterns are thereby generalisations by nature, and cannot establish the idea that they reflect natural essential properties for the individuals depicted, without an additional premise that some of the generalizations are upon some special kind of properties. The special properties here are, as Wilson said, the *persistence conditions*. But whether the individuals that are described by a pattern have persistence conditions, is dependent on our pattern-description, thus when we have a pattern description that does not agree with the persistence conditions, we cannot say that these conditions are *necessary* or *essential* for the individual. The pattern-theory of natural kinds, and its accompanying pluralism, is not strong enough to establish metaphysical essentialism.

[76] (Wilson 1999, chapter four).
[77] Not such that we actually have to have it, but that it exists.

4.2.3 Kinds and laws

Lowe disagrees with Putnam's account for natural kind terms, and will also disagree with Wilson's alternative. According to Lowe, the account of Putnam is based ultimately on a Lockean framework wherein individuals are central and primary, and he would rather ground essentialism in a theory with Aristotelean roots with a much more intimate relation between individuals and kinds.[78] The Aristotelean roots are fairly clear when we look at Lowe's theory of the four category ontology. According to Lowe, there are in principle four kinds of being: substantial kinds, individual substances, attributes and modes.[79] He defends this four-category ontology in his *The Four Category Ontology*.[80]

Because individuals instantiate kinds, their existence is *dependent* on this instantiation relation. Thus, contrary to what Wiggins argues for, the individuation and identity are sortal dependent because of the reality of universals and the instantiation relation. The dependence works both ways according to Lowe, individual things are dependent on their sortal, and universals are dependent on individual things. The universals are thus not something 'outside' the individuals but within the individuals of the kind.

The sortal terms that stand for the kinds that individuals instantiate, are *real,* according to Lowe, in an Aristotelean sense: sortal terms have a 'genuinly referential or name-like role, regarding their referents (sorts or kinds) as *universals* conceived in a manner of 'Aristotelean' or 'immanent' realism.' (Lowe 2009, 2)[81] These universals are subject to natural laws, according to Lowe. There are natural laws about mammals, for example, that explicate the way mammals are, and therefore these laws explicate the real kinds:

> [M]*ammals* constitute a natural kind, in virtue of their being such distinctively mammalian laws as that mammals are warm-blooded and suckle their young. (Lowe 2009, 5-6)

The laws governing the individuals of the kinds they are about, are not as strict as, for example, the law of gravitation. They express *dispositional* characteristics of individuals falling under the laws: not every mammal suckles its young, but under normal circumstances they do: they do it dispositionally.[82]

It is extremely difficult to directly challenge this conception of natural kinds, laws and dispositions, especially because Lowe believes that what is necessary for the sortal dependency theory is no so much the concept of natural kinds, but of category such as 'living organism'. The category is supposed to provide the general criterion of individuation for the individuals of all natural kinds that fall under the category. Therefore I do not pursue a head-on refutation of this position on natural kinds. What is done, however, is an indirect refutation in the following sections of this chapter. I will indicate examples wherein I believe the theory of natural kinds does not accommodate the disorder of nature and individuals (sections 4.4 and 4.5), and in section 4.3 I argue that biological practice does not use this kind of conception of kinds and laws, rather, they use evolutionary principles in

[78] (Lowe 2009, 214).
[79] He presents it in a 'neat' scheme wherein the interrelations are exemplified, but that is not necessary to reproduce here, since they are pretty obvious: individuals instantiate kinds, modes instantiate attributes, attributes characterize the kinds and modes characterize the individuals.
[80] (Lowe 2006).
[81] See also (Lowe 2006, 162).
[82] See (Lowe 2009, chapter 9 and 11), especially p. 153 to 163.

their practice. The thesis of categorialism will be challenged directly in section 4.4.3 by showing that the categories Lowe proposes are still not determinate enough.

4.2.4 The plasticity of species

With his move to categorialism, Lowe distinguishes the sortal dependency thesis from the ordinary species. But recently I came upon another interesting idea that might establish the connection between the required concept of natural kinds and species, based on new biological insights. Stephen Boulter[83], a defender of Neo-Aristotelianism, pointed out to me that there have been some radical changes within biological theory on the nature of species and its relation with genetics. There are some reasons to believe that the generally accepted conception of evolutionary processes is mistaken. It is often believed that there are many possibilities for evolutionary development and that the development of species at a larger scale and of individuals themselves is underdetermined and allows for all kinds of variations. The development of species and of the individuals of the species would only be determined by the level of genes and gene-pools. The basic concepts for evolution are on this view *populations* and *genes*, not *kinds*.[84] But recent studies show that evolution is much more plastic than believed: there are considerably less possible outcomes of evolutionary development and the development of individuals themselves than what is claimed by classic evolutionary thinking.[85] There are what Boulter calls 'species specific developmental programs': certain sets of genetic codes that dictate that there are only a few possible outcomes of development. What the *actual* development of an individual will be is dependent upon both these sets of genetic code, and the interaction with the development. The fact that the development of species, and of individuals, is quite plastic, might allow for some Aristotelean kind-conception that is closely associated with species. Boulter suggests that, what constitutes the plasticity of the development in species, the developmental program, is the most plausible candidate to find as the 'essence' in individuals: it tells us *what* the individual organism *is*. An individual has a developmental program, gained by the membership of its species, which dictates the possibilities of the individual's development. The developmental programs are quite species-specific and are because of their rigorous nature not apt for drastic changes. Boulter suggests that these developmental programs might be seen as the modern, scientific equivalent of *secondary substance*, or *form*.

Boulters suggestion that conception of natural kinds should be found in the species-specific developmental program might serve to rescue the sortal dependency thesis, because it would establish that we can regard any individual, metaphysically, as a *this such*: it has a species specific developmental program which determines its *this suchness:* what it is. We will come to see, however, that this does not work either. It might, if biologists can truly establish this thesis of the developmental program, provide answers concerning hybrid individuals, which are discussed in section 4.4. However, I argue in section 4.5 that, in the case of plants and our practices of genetic manipulation and grafting, this suggestion fails to establish the relation between kinds and species in such a way that it will rescue the sortal dependency thesis.

[83] From personal conversation and his presentation on modal explanation in biology (Boulter 2011).
[84] For this somewhat classical view on evolution, see (Mayr 2002).
[85] A recent treatment of these studies and their interpretation can be found in (West-Eberhard 2003). She defends the developmental plasticity of evolutionary development and advance the 'Developmental plasticity hypothesis of speciation'.

4.3 Biology and kinds: the species problem

There are some compelling reasons to believe that the Neo-Aristotelean conception of kinds cannot be equated with the species, and these reasons we can find in the discussions of the species problem in the philosophy of biology. The species problem is, in the first place, a question as to what the right concept of 'species' is. It turns out to be quite problematic to define 'species'. Species do not behave as clear classes, this much is clear; they change, overlap and allow for much variation within populations. I discuss two suggestions to solve the species problem. This discussion is far from conclusive, but is doesn't serve the purpose to either solve the species problem or give an overview of species definitions. It is intended to indicate that species, regardless of the specific species-concept, do not behave in the way the sortal dependency theorist needs. The argument that biological species really do not give ground for a Neo-Aristotelean conception of kinds will follow this discussion in section 4.3.3.

4.3.1 Species as individuals

David Hull and Ghiseling both propose a rather extreme solution to the problem of the species. They argue that the solution of the species problem is to regard a species more as we regard an individual.

Hull[86] and Ghiselin[87] give convincing results of studies of the uses of species-terms indicating that these terms are not used like natural-kind-terms. Ghiselin concentrates on the use of species-terms, and points out that we treat individuals such as firms and countries in the same way: their names are proper, there cannot be instances of a species, they do not have defining properties and their constituent organisms are part of, not members of, the species. Hull focuses on evolutionary development of species. First of all, he finds that the way new members of a species come into existence, is through rough *copies.* Secondly, new species and dying species change in the same way as individual organisms throughout nature do, and they provide 'offspring' in the same way organisms do. And most importantly, in nature much cross-breeding and indeterminateness of 'two' species occurs, as we will see in our discussion of the donkey/horse hybrids and ring-species. According to Hull and Ghiselin, this indicates that we should treat species as changing *individuals* rather than *natural kinds*. Hull even concludes that there is no such thing as a 'human essence' and proposes that the unity and conformity of the individuals that fall under the species is caused just by the fact that these individuals are drawn from the *relatively* uniform gene-pool.

If at least some core of truth can be found in this conception of species, we might wonder whether we can speak of *laws* governing the specific species (except from evolutionary laws in general that govern the development of species). It should therefore be clear that this conception of species is far from what Wiggins and Lowe can accept for their theories, first of all because *individual* is taken to be something completely different, and secondly because it denies any form of essentialism. There are some conceptual problems with this proposal, however, because if species are actually *individuals*, this account implies that there are *scattered* individuals which problematic. We can ignore this for now, because what is the interesting aspect of the proposals of Hull and Ghiselin is not so much their *species as individuals* suggestion, but the reasons why they feel they have to suggest such an extreme position. It is clear from their investigations that species do not behave as classes

[86] Cf (Hull 1987).
[87] Cf (Ghiselin 1981).

and are therefore not appropriate to regard as natural kinds in the sense required by the defenders of the sortal dependency theorist.

4.3.2 The biological species concept

We can find a less radical proposal in the work of one of the leading figures in biology, Ernst Mayr. He wrote quite extensively[88] about the philosophy of biology and specifically about the problem of species.[89] In one of his latest treatments on the matter, he defends the *biological species concept*, which says that a species is an isolated reproductive community. 'Species' is defined by reference to reproduction and ultimately to the gene-pool and genetic relations between individuals and generations. The upshot of this is that it allows for species-development and vagueness. When a group of individuals do not have a completely isolated gene-pool, there will be vagueness as to whether some of the individuals belong to the species or not. This is exemplified in the case of for example ring-species as discussed in the next section, and hybrid individuals whom we will discuss in the section 4.4. This conception of species again shows that species are not the kinds that Wiggins and Lowe need, precisely because they allow for these cases of vagueness. For the sortal dependency theory of individuation, it has to be determinate *what such* an individual is and the indeterminateness of the biological species concept therefore is unsuitable for their theories.

This is not intended as an argument *against* the concept of kinds that is needed for the sortal dependency theory, but it does indicate that the species as understood by biologists is inadequate as natural kind as the sortal dependency needs. The defenders of the sortal dependency thesis therefore have the burden to come up with a conception of kinds that on the one hand allows for a scientific informed concept of 'species', and on the other hand distances itself on the crucial characteristics of species as the vagueness and indeterminateness that is allowed in biological classification. The following sections argue that this is problematic. I consider the taxonomic practice and there we can see that the taxonomic practice does not cohere with the conception of kinds the sortal theorist needs.

4.3.3 The taxonomic practice and kinds

We already saw hints that taxonomy does not revolve around natural distinctions provided by the nature of things in Dupré's arguments against Putnam's theory of natural kind-terms. Even in Linnaeus's taxonomy, this was not the case. In Linneaus's system of taxonomy, many decisions of classification were made upon quite arbitrary grounds. One of the peculiarities, for example, is that one of the classification criteria was the shape and number of teeth. That had some strange consequences, for example that lions and animals like them were classified together with for example weasels and other mustela species. Nowadays, the taxonomic practice and determination principles are perhaps less arbitrary.[90] The evolutionary development of species is considered to be much more important, but higher classification is simply not governed by supposed natural principles; pragmatic choices on what properties are relevant for which classification remain influential. There are some interesting puzzles in the taxonomic practice in which this is exemplified.

[88] But by no means exclusively.
[89] See (Mayr 2004).
[90] It is forcefully defended by Ridley that the only justifiable principle of classification is the *phylogenetic* classification which is based on evolutionary history of the species. (Ridley 2007).

For example, the occurrence of the platypus has puzzled biologists long since. A platypus both lays eggs and suckles its children. Therefore, we have reasons to classify a platypus under both the genus 'reptile' and 'mammal'.[91] There seems to be no ground within the animals themselves to classify them under either one. Biologists took an easy way out: Platypuses are classified under the mammals, even though there was no class within the mammals to which Platypusses could belong, and hence they created a new general class: platypuses (ornithorhynchus anatinus) instantiate the genus ornithorhynchus. That platypuses are classified as mammals is due to Blumenbach. It would be natural to suggest, nowadays, that evolutionary theory will answer whether Blumenbach made the right decision on this point whether a platypus really is a reptile or a mammal but it doesn't. The evolutionary development from reptiles to mammals is one of degrees; the platypus is not the only borderline case, and that is not even to be expected. That our concepts 'reptile' and 'mammal' do not precisely govern all instances of this development is somewhat trivial. It is one of the characteristics of evolutionary development that it allows for all kinds of small and larger variation.

Given the fact that we now classify a platypus as a mammal, what does this say about the sortal dependency thesis? Take Lowe's strong realism here and we see that we can question whether his position truly describes what happens in the biologists decisions. According to Lowe, there are mammalian laws, but in the case of the platypus we should wonder what the laws are. No matter how we classify the platypus, it is going to fail to accommodate either the laws governing reptiles or governing mammals. Therefore we should wonder on what grounds we can judge 'laws' of species or other level of organism classification. For David Wiggins's conceptual realism there seems to be a fairly easy way to answer this example. He will say that by our discovery of the platypus we have reasons to believe that 'mammal' is not a proper sortal concept. For Wiggins 'platypus' is the right sortal concept, and that incorporates that the animals falling under this concept have both characteristics of a reptile and of a mammal. This seems to be fairly unproblematic.

However, similar problems as with the reptile/mammal distinctions occur at other, and lower, levels of the taxonomic system. It does not really matter which level one thinks the proper one is to look for determinate natural kinds, the level of the class, the family, the genus or the species or even sub-species; at all these levels these kinds of instances occur. The next sections discuss some examples and argue that the sortal dependency theorist is forced both downwards and upwards to on the one hand more specific, less general, sortal concepts as natural kinds, and on the other hand to more general sortal concepts, in order to accommodate the vagueness that is displayed by organisms.

One of these difficult cases can be found in the phenomenon of ring-species.[92] A ring species is a complex of different related populations, often geographically distributed in a ring-shape, hence the name. They are, however, not only geographically ring-shaped, the interbreeding possibilities are also ring-shaped. Populations that live close together are capable of interbreeding, but populations that are further away from each other cannot interbreed. Because of the geographical distribution of the populations, the interbreeding possibilities are like chains in the ring-shape. There are several instances of proper ring-species complexes reported. One complex, the Herring-Gull complex, is most interesting for our purposes here because that complex is not a proper ring-species and will put the most pressure on the sortal dependency. But let us first consider a proper ring-species. The most

[91] For a description of the platypus and the history of our knowledge of them, see (Moyal 2004).
[92] See (Mertens and Packert 2007) for a concise introduction of the concept 'ring species'.

famous, extensively studied instance of a ring-species is the Ensatina complex.[93] This is a complex of up to seven populations of salamanders, illustrating the early stages of speciation. These populations are geographically spread over an area in southern California. Their genetic flow, geographical locations and differences have been investigated, and the results are astonishing. Wake concludes from the instance of the Ensatina complex that species development makes taxonomic practice difficult:

> *Ensatina* illustrates the continuing difficulty in making taxonomic assignments in complexes studied during species formation. (Wake 1997, 7761)

Taxonomy in these cases is so hard, because typical criteria fail constantly. The complex displays a 'full array of intermediate conditions between well marked species and geographically variable populations'.[94] Thus while we have some criteria that indicate that we have to conclude that this complex consists in several species with hybridization possibilities, there are other criteria that indicate that we should speak of subpopulations of one species. We are forced both into what I described the upwards and downwards movement.

The sortal dependency thesis could perhaps include this example, by concluding that the concept of 'ring species' is included in the sortal concept for the salamanders and that this concept thereby includes exactly the vagueness that is displayed by the individual ring-species populations, a strategy that seemed to work for the platypus case. However, there is another interesting similar complex that complicates matters, the Herring-Gull complex. The Herring-Gull complex is a circle of gull-groups, living around the north-pole in the following configuration:

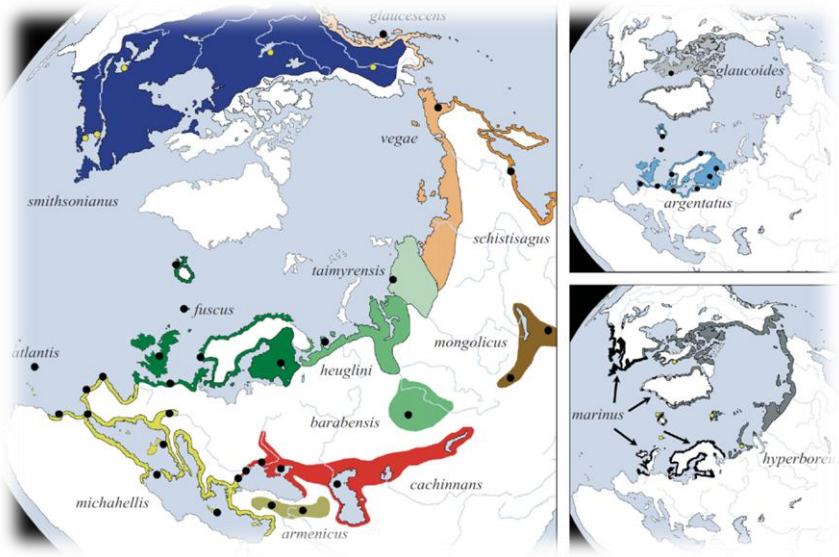

Figure 1: The Herring Gull Complex

Breeding ranges and sampling locations (dots) of the gull taxa investigated. From: (Liebers, Knijff and Helbig 2004, 896)

According to specialists, however, this complex is not really a ring-species.[95] It misses the geological overlap at the end of the circle which is part of the definition of ring-species. How are we to look at this complex? It is not an ideal ring-species, neither an ordinary species, so where do we put the line

[93] (Wake 1997).
[94] (Wake 1997, 7761).
[95] See (Liebers, Knijff and Helbig 2004, 897-9).

between the present populations and their status as species? This complex is an instance of hybridization to its fullest extent, where the process of evolution will probably result in a few entirely separate species. Are there sharp edges in this complex that we can designate as constitutive for determinable separate *kinds*, as Wiggins and Lowe need them? The geographical edges seem to fail, because there are numerous cases of interbreeding. Calling the entire complex one *kind* seems unattractive because of the interbreeding boundaries between several of the populations. The biologists have decided that this is not one species, but a complex of interfering species, but what the exact species are, simply is unclear. This vagueness and indeterminateness seems to fit Mayr's definition of species much more than the needed classificatory concept of the sortal dependency theory.

What should we learn from this? I believe that the insight of biological classifications show us that we are forced in two opposite directions if we want to hold on to an ideal of natural classification. The one direction is upwards in the system, losing the fine-grained aspects of natural kind terms, but thereby avoiding many problematic instances of vagueness. This strategy is taken by Lowe. According to Lowe, it is possible that there are more natural kinds that share the same criterion of identity. In the case of the ring-species, both the Esatina and the Herring-Gull complex, this strategy would avoid the problematic indeterminateness because no matter what biologists would decide with regard to the distribution of natural kinds, as long as these share the same criterion of identity this is no problem.[96] The other direction is downward in the system, towards an even more fine-grained level of concepts than species terms. This is the strategy of Wiggins. According to Wiggins it is not necessary that our scheme of conceptions of kinds is correct yet: it is the task of the sciences to investigate the organisms and suggest adaptations of our concepts such that we will ultimately get a better fine-grained scheme of concepts of the individuals. Both the individuals *and* the conceptual scheme will contribute to these investigations, as he phrases the famous fishnet metaphor:

> Our claim was only that what sortal concepts we bring to bear upon experience determines what we can find there – just as the size and mesh of a net determine, not what fish are in the sea, but which ones we shall catch. It is true that the individuative conceptions that are brought to bear at any point will come with notions about the ways in which things of a given kind behave. These notions will bear on persistence conditions. But this does not imply that, once things of a given kind, fs or gs, are lighted upon, the individuative scheme we bring to bear will itself determine something further – a principle of activity or a persistence condition. (Wiggins 2001, 152)

According to Wiggins, we have to go back and forth between the word and our concepts and perfect them by these investigations.

Both the *upward* and *downward* direction, I believe, will inevitably result in a problematic position. Because the vagueness displayed by the ring-species and the platypuses are by no means unique, it will be necessary to continue the move upwards and downwards further and further. The ultimate ends of the two strategies will be problematic. In the case of the move upwards, the end of the move will be at the most general concept like 'thing' or 'entity' which is no longer sufficiently informative for the sortal dependency theory. It is the task of the defender of this strategy to argue that there is some level of concepts that is still informative enough, where there are no cases of vagueness as displayed by for example the ring-species. The move downwards has to avoid a similar threat. Within

[96] (Lowe 2009, 1-2 and 16).

species, there is a considerable amount of indeterminateness, as for example hybridization shows. With any class of individuals one considers, there will be similar difficulties, and the defender of the move downwards has to give a reason why some properties will not matter for the sortal dependency thesis and other do. Otherwise eventually we will need for any individual a separate concept to answer the question 'what is it?' and these individual specific concepts will not really be sortal concepts. A reason has to be given why there is a level at which the downward movement can stop.

The next sections present a series of instances at several levels of organic life that will sharpen this problem for the sortal dependency thesis and should indicate that it is an inescapable one. The presented biological phenomena should establish that both directions, upwards and downwards, rest upon an unwarranted assumption of essentialism. It is argued that these examples problematize the essentialist requirement of the sortal dependency thesis of individuation, and that it is much more adequate to take a realist strategy in order to explain individuation of the biological individuals. This strategy is defended in the next chapter.

4.4 Biological Individuals

This section investigates some interesting categories of biological individuals that problematize both the described strategy *upwards* and *downwards*. It is argued that the sortal dependency theorist cannot accommodate the biological phenomena.

4.4.1 Hybrid individuals

The first category of interesting cases is the category of hybrids. Some of the best known hybrids are mules and hinnies, the offspring from horses and donkeys. Another interesting example of hybrids is found in the interbreeding of lions and tiger, which results in tiglons and ligers. The occurrence of hybrids is very common in nature, especially with plants.[97] What happens in the case of the mule/hinny example is that two recognized distinct species, as for example horses and donkeys, interbreed. Their offspring, though generally sterile, can be fertile.[98] The occurrence of hybrid individuals shows that many of the sortal concepts we have of biological individuals do allow for vagueness. Is a hinny a horse? In some sense it is: it has many similar characteristics and it behaves in typical ways for horses. But in some sense it is not a horse, for it *also* has typical characteristics of donkeys. Hybrids seem to display the kind of indeterminateness that is problematic of the sortal dependency thesis of *individuation*.

In fact, Lowe sees this problem and suggests the typical strategy that I described as the *move upwards*. He believes that ligers, tiglons and ordinary lions and tigers, though perhaps distinctive *natural kinds* share the same criterion of identity.[99] He thereby obviously loses the close connection between the sortal categories as relevant for his metaphysics, and the biological species.

The move downwards faces a problem with hybrids. There are two options available for a defender of the downwards movement. The first solution would be so say that we should accept a new concept for the hybrid individuals: 'hinnies', 'ligers' and other hybrid individuals all have a distinct principle of activity, and are therefore natural kinds. The second solution is to say that the hybrid

[97] See (Mooney and Cleland 2001).
[98] For examples, see the ring-species complexes discussed in section 4.2. There are also instances of fertile mules, one reported by (Rong, et al. 1985).
[99] (Lowe 2009, 1-2 and 16).

individuals are to be understood as *defective* individuals; that the true kinds are the kinds of the parents and that there is something *wrong* with these hybrid individuals.

I believe that the latter strategy is fallacious, because it introduces a choice of 'proper species' while the occurrence of these hybrid individuals shows that this is a problematic assumption. The same holds for the similar, slightly less normative, suggestion that we can understand these individuals by reference to both species of its parents. Why is it in principle impossible for me to understand ligers as animals on themselves, and take that as the proper class, and then claim that we can understand its parents, tigers and lions, in reference to their contribution to this class? Does nature force us to believe that this is an real asymmetry of classification of hybrids? It might feel attractive in the case of these ligers and their parents, since the ligers are children of their parents and no the other way around. But we will see that other forms of hybridisation also happen in cases of non-sexual reproduction, in plants, as for example in our processes of grafting (see section 4.5) In these cases the process is reversible. Therefore the strategy that claims that there is an asymmetrical dependence of hybrid individuals upon ordinary species is not successful in understanding hybrid individuals.

We are left with the first suggestion, that we should introduce a new concept for the hybrid kinds. This seems to be quite unproblematic – the move downwards seems to escape the hybrids as indeterminate individuals. However, this suggestion is in tenstion with the next category of hybrid individuals: the chimeras. This will be discussed in the next section.

4.4.2 Chimeras

Matters become even more pressing if we consider not hybridization, but chimerisation.[100] In the case of hybrids, the animal has one family of cells resulting from one zygote but from two gametes. These cells will be genetically on a par. But in the case of a chimera, not only are there two gametes involved (either naturally or artificially), but also two zygotes. The consequence is that there will be a mixing of cells which are genetically of different species, resulting in mixed characteristics in one individual. For example, in the case of some cultivar trees such as the *+Laburnocytisus* 'Adamii' (Adam's Laburnum), from the same tree branch two completely different kinds of blossoms can arise: the cells of the two kinds are coextensive and mutually dependent, and above all, mixed in these plants. Chimerisation happens in plants quite often, but modern science has shown that the process is even possible for common animals as well. The most famous example is the 'geep', the sheep-goat, which has four parents, because it grew from two zygotes.[101]

Chimerisation has been extensively described. It can happen at different levels, and from different sources. Two large groups of plant chimeras are due to mutational processes, either in its platid genes, or in the nuclear genes. Another group results from the chromosomal constitution of individuals: if through influences some division process fails, it can happen that the resulting cell misses a chromosome or some fragments. This results in different kinds of cells mixed within one individual. And the last category, which will be the subject of the section 3.3.2, is the graft chimera. This is a group of plants that result from a process of grafting, something we do industrially.

[100] Plant chimeras are extensively described and discussed in (Tilney-Bassett 1986). My description of plant chimeras is for a large part dependent on their treatment.
[101] See (Polzin, et al. 1987) for a description of the process of producing a sheep-goat chimera.

Chimeric individuals pose another kind of indeterminateness than ordinary hybrids. These individuals are actually made up out of two kinds of organisms and therefore belong to both kinds of whichthey are made up. It seems simply biologically inadequate to claim that they form a distinct natural kind for which we should introduce a new sortal concept. The move downwards towards more specific concepts of the individuals at this point will lose the appropriate connection with biological kinds.

One could think that in the case of a chimera, we could still 'understand' the two extremes in reference to the kinds of the original zygotes. This is a move upwards. However, this strategy will not work, for in plant chimeras an individual can actually result from one zygote due to cell-division or genetic mutation. One could also claim the asymmetrical dependence to be relevant, as in the case of the hybrids. However, since the process of chimerisation can even happen *within* in one individual both by mutations and external influences,[102] without actually being induced by two different *kinds*, this is not an option to explain chimeras at large. In some cases of plant chimeras the process is also reversible over generations: one chimera will have offspring of one of the two kinds it is a chimera of, this happens for example in the case of the Adam's Laburnum. I think that in this case we truly face a problem for the sortal dependency theorist: we do not have proper sortal terms that adequately describe these individual objects, and the concepts that we can introduce should appreciate the indeterminateness of kind-memership of chimeras, otherwise they are simply biologically ill-informed. Can we really claim that these individual biological creatures have a *real essence*? The sortal dependency theorist is forced downwards, towards more specific sortal descriptions faces a true problem here because it cannot allow for the indeterminateness chimeras display. Chimeras cross many boundaries of ordinary natural kinds, both naturally and artificially. I will increase the pressure upon the sortal dependency theorist even further in section 4.5, where I will discuss the artificiality of grafts and cultivars and their kind-membership.

4.4.3 Small cellular-levels of life and the category of *living thing*

At smaller levels of organic life, the problems for sortal dependency become serious for Lowe's move upwards as well. Wiggins already discusses the case of the amoeba.[103] An amoeba is a single cellular organism capable of multiplying by cell-division. The direct Wiggins asks, is whether, after the cell division of an amoeba there is a situation wherein the original amoeba persisted, and a new one came into existence, or rather that there are two new amoebas and the original one ceased to exist. The conclusion of sortal dependency together with the doctrine of absolutism results in his choice for the latter. But does the multiplication process of amoebas force us to this conclusion?

I want to side with Wilson[104] on this, in saying that we probably feel forced to answer the question whether the original amoeba persisted or not because our concept of 'individual' is misled by the obvious animalistic examples. If we were to take the singular cell organisms such as amoebas seriously from the start, we are not forced into this question and this need for such an answer. We feel that there has to be an answer as to whether the amoeba that splits into two *ceased to exist*, or that it *persisted* and is one of the other two remaining amoebas. But the biology of amoebas is fairly simple: the amoeba really *splits* into two amoebas and hence both *nothing* really ceases to exist *and* two amoebas come into existence: there simply is no answer to the question 'which one of the resulting amoebas is the original one?', nor is there an answer to the question 'did the original

[102] This can happen in plants, for example in potato chimeras (Tilney-Bassett 1986, page 38-39 and chapter 8).
[103] (Wiggins 2001, 72-3, 83-4). For a description of amoeba, see (Kotpal 2009).
[104] (Wilson 1999, 1.3).

amoeba cease to exists'? The process of cell-division is such that it does not really allow for an answer to these questions. But the individuality of an amoeba is quite clear: the material unity of the amoeba is easily recognizable and it is also visible when two amoebas resulted from the process of cell-division. Hence I think we should conclude that the individuality of an amoeba is not determined by what kind of organism it is: it is determined by the material coherent unity of the amoeba.

Another category of micro-organisms makes the ultimate move upwards to the ultimate sortal 'living thing', or 'organism' problematic. Biologists have long since debated about whether a virus is actually a living thing, because viruses on the one hand contain typical characteristics of living things such as amino acid structures and the ability to self-assemble, but they lack the possibility to reproduce on their own strength and they are structurally in need of a host for this.[105] But, when a virus enters a cell it can influence the reproduction of DNA such that it is multiplied. A virus can have serious consequences for living things, but not always negatively.[106] If a virus nests itself in the DNA structures and influences the processes of the living individual, how do we have to individuate this virus? The category of 'living thing' seems to be inapt here, but without it, we seem to have no grasp of what a virus is and does when it is manifesting itself within a living individual.

I think that the occurrence viruses problematize Lowe's strategy that the individuation of individuals or particulars is at least determined by some general category of existence, not necessarily by the natural kinds. We saw the suggestion that tigers and lions have to share the *same criterion of identity*, according to Lowe, and this escapes the problem of the indeterminateness of hybrid individuals. But Lowe then has to argue that there is a level of categories at which there is no such indeterminateness. There has to be some ultimate set of categories such that it is not indeterminate whether some individual shares the criterion of identity associated with one of the categories or not. I think that the existence of such ultimate categories of being is a myth. Lowe suggests that these ultimate categories are categories like *living organism, geographical phenomenon*, *geological formation* and *material artifact*. But we know from for example discussions on the definition of 'life' that the category of 'living organism' will inevitably face indeterminate cases as well, of which viruses are one striking example.[107] But if even 'organism' is not an appropriate category, and we should even go beyond it, we have to get to some category of 'thing' that is too vague to really be said to provides a principle of individuation for everything that falls under it: it would imply that viruses, bacteria, fish, mammals and all other kinds of animals, plants and fungi etc. actually have the same criterion of identity. This, I think, is empirically falsifiable: for example bacteria have quite other persistence conditions than human beings; otherwise our antibiotics would kill us to.

4.4.4 The explosion of the examples: broadening the search

Perhaps, the sortal dependency theorist might still want to employ the strategy to say that the examples of the previous sections are actually just special cases – and that overall, nature seems to be fairly clear on what the proper populations and breeding possibilities are. Then a natural suggestion is to say that we can understand these border-line cases in reference to the proper cases, that they are somehow only *parasitic* upon the other proper populations and processes. However I believe that this kind of strategy does not appreciate the number of cases that are present in nature.

[105] See (Alberts, et al. 2004, 4).
[106] There are even indications of viral induced chimeras (Tilney-Bassett 1986, 58).
[107] For an interesting discussion on definitions of 'life', see (Thompson 2008, Chapter two 33-49).

The discussions of both the sortal dependency thesis and the problem of the species in the philosophy of biology focus their attention upon animal life. There, because of the nature of sexual selection, populations are relatively stable. It is easy to find typical traits, either in pheno- or in genotype within animal populations and to regard the border-line cases as freaky instances. But since the sortal dependency thesis is a *universal* thesis that applies to *any* individual, I think this is a far too narrow class of considered cases. We should take into account the domain of plants and other non-animal life-forms as well. I have discussed some important classes of and hope that these cases will make it clear that hybridization, speciation problems and co-existence difficulties as discussed above are not that rare. They are real, common and they are problematic for the sortal dependency theorist.

There are also many instances of symbiotic life-forms, parasitic life-forms and all kinds of other forms of mutualism which have so far completely ignored in the discussions. I think that it should be clear by now, that many of the 'solutions', and even the questions, are dependent upon a bias about what we could call the *paradigmatic examples*. I cannot stress enough that all kinds of eccentric forms of life aren't that peculiar to nature itself, only to us. They might be strange *for us*, because we do not encounter them that often, or in ordinary life at all, but that doesn't make them less relevant for our reflections on life-forms generally. If one devises a metaphysical universal theory about any thing, or at least any living thing, it should account for all life-forms equally, and we should beware of taking the life-forms that we are acquainted with as the *paradigmatic* examples from which we have to devise a theory for all other life-forms. The life-forms we are acquainted with may be the *starting point* for out reflections on life-forms, but that doesn't make them the paradigmatic starting point.

I hope that up to this point, I have presented enough material to indicate that there is be a problem with the sortal dependency thesis of individuation. I have now shown that nature is not that simple, and that it is implausible to suggest that there are the *kinds* that have ontological primacy *over the individuals,* that kinds *determine what an individual organism is* in the Aristotelean sense. As should have become clear from all the examples above, we see and investigate a lot of individual organisms, without having any clue what *kind* of thing they are, and without there being a way of answering what *kind* of thing they are in such a way that the demands of the sortal dependency thesis for individuation are satisfied. Therefore the sortal dependency thesis fails to accommodate the disorder of organic nature.

4.5 Artificial biological individuals

Matters are even worse for the sortal dependency theorist. The examples discussed above are mostly *natural* examples, and therefore they might seem to be treatable by the sortal dependency theorist: one might feel that since nature gave us these examples, the right 'mesh of the net' of our conceptual scheme only needs to be adapted in such a way that these examples are properly classified and then again we recognize everything as a member of a real kind. But besides the fact that such an answer to these problems tends to beg the question at the arguments presented in the previous sections, I will try to show that it is a problematic answer for other reasons. We have many production practices that seem to problematize the sortal dependency thesis even further; the practice of cultivation and grafting. These practices put pressure on the distinction between the agreed nominal essences for *artefacts* and the supposed *real essences* in organisms and other natural categories.

4.5.1 Genetic manipulation and cultivation

There are many kinds of practices in which we manipulate individuals and *create* new kinds, as in cultivation processes, genetic manipulations etc. Our whole food industry depends on our capacities to cultivate and manipulate the kinds of grains, apple trees and vegetables both genetically and by cultivation. In these processes we *create new kinds* of individuals based on their desirable characteristics. How is the sortal dependency theorist going to hold on to his thesis in these cases? He has two options, either he denies these kinds to be real or *natural*, and thereby he should conclude that the resulting individual plants are also more like artifacts, e.g. tables, than real natural individuals. This is in the light of our treatment of all kinds or strange natural individuals and processes, not a favorable option. In many instances, such as in grafting and cultivation, we do intervene, but not in a way that is truly detached from what happens without human intervention. This strategy puts the role of human intervention too central in the explanation of the process of cultivation. Aren't the grains that result from these processes as much an organism, a living thing, as the 'natural' kind grains are? I think that we should refrain from the suggestion that these individuals are in a biologically sense any different than organisms that came into existence without human intervention.

The other, more plausible, option is to say that the created kinds are true natural kinds, and that we therefore should introduce new sortal concepts of the kind that the manipulated individuals exemplify. Prima facie I think that this is in tension of how the practice of dealing with these kinds and individuals is. We do introduce new concepts for newly created kinds, but these concepts often reflect the desirable characteristics of the kinds that are created. But there is even something more problematic for the sortal dependency theory that results from our industry of cultivation: the phenomenon of grafting. This is discussed in the next section.

4.5.2 Grafting and the individuals

The interests we have in the practice of cultivation often conflict. We need plants that are strong and can survive many diseases and complicated living circumstances. But we also want our bushes to be dense, our apple trees to grow large fruit and our blossom trees to have all kinds of beautiful blossom. It turns out that many plants that have the ability to endure in difficult circumstances do not have the other desirable characteristics – they will grow less and smaller fruit for example. The same holds the other way around: many plants and trees that have the desired leaves, blossom or fruit are vulnerable.

The plant industry knows a way of combining the desirable characteristics by grafting the strong kinds and the desirable kinds. A graft is a hybrid plant which most of the time has the roots of one kind, and the upper part of another. The process of grafting is fairly simple. We grow two plants in contained environments and when the plants are strong enough, we take both, cut off either the roots or the upper part, and put the remaining parts together. When done properly, the two plants will together form a living plant with the desirable characteristics: strong and resistant roots and beautiful flowers or other nice qualities.

The initial question for the sortal dependency theorist about a grafted plant is: 'what such is it'? And here we truly reach an impasse: is such a graft a member of any real kind? Or is it member of an artificial kind? The graft is a plant, a living organism but also an artifact, man-made. It has properties that are naturally not combined in one plant, but turn out to be biologically compatible nonetheless.

It is therefore an artificial hybrid. But it is a more complicating organism for the sortal dependency theory than the hybrids discussed in section 4.4, because the hybridization of a graft happens in the same generation and not by natural reproduction.

If one chooses the strategy to claim that these hybrids are really artificial, the problem arises that these grafts also can occur naturally, as happens in the case of inosculation[108] – so then one is forced to remain consistent, and deny those instances of hybrids to be natural kind as well. But that seems to be arbitrary to say the least, and implausible at best. If there is no human intervention whatsoever, who are we to deny the individuals and their kinds to be natural?

If one says that these instances and the kinds are natural, then the sortal dependency theorist should accept that these kinds and the concepts we have of these kinds do not behave in such a way as the sortal dependency theorist needs. For we simply depict the characteristics of the plants we want to produce and force organisms to become that way: the characteristics of the individuals are what we are interested in. These individuals and their kinds are artificial in that sense, and basically *nominal*, not *real*. In the case of a graft, it is *what it is*, not because it is member of some kind, but because we want that plant to be such and so. Two grafts are also never really the same; not even the merging of the two parts of the graft is structurally similar in all grafts. Grafts can form various degrees of mergence even up to the degree that they can properly be called chimeras. Then the individual plant really is a mosaic individual: it is an individual despite the fact that it ignores natural-kind boundaries.

The sortal dependency theorist faces a true problem here: the existence of a graft does not appear to be determined by its kind-membership in any sense. It is what it is because the two parts cohere with each other, not because it instantiates a kind of graft-organisms.

4.6 Biological individuals, kinds and sortal dependency of individuation

This chapter argued against the sortal dependency thesis of individuation. It investigated the notion of natural kinds, and argued that this notion is a) not compatible with the concept of 'species', and b) that it is incompatible with taxonomic practice. The sortal dependency theorist has two strategies to deal with these two problems: a move *upwards* and a move *downwards*. The move upwards, defended by Lowe, has to resort to some category of 'living organism' in order to avoid the vagueness displayed by hybrid and chimeric organisms. This categorialism was criticized, because it rests on the implausible assumption that with the category of 'living things' there will be no vagueness. The discussion on viruses challenged that assumption. The move downwards, defended by Wiggins, has to hold that in the case of the hybrid and chimeric individuals our conceptual scheme is not perfect yet, and that it is possible that there will be, ultimately, a net of sortal concepts such that they can avoid all vagueness. This was argued to be biologically ill-informed, because of the enormous array of indeterminacies that biological individuals display.

Next it was argued that the sortal dependency thesis of individuation faced a problem with our practice of cultivation and grafting. It seems inappropriate to claim that the individual organisms that are the result from grafting are dependent for their individuality of their kind-membership. From these examples we see that the material coherency of these individuals is sufficient for them to be individual objects, and based on this I think that the sortal dependency thesis of individuation is an implausible thesis for biological individuals.

[108] Inosculation is the merging of two trees, a natural grafting process.

This concludes the third and final step in our argumentation against the sortal dependency thesis and it is therefore now safe to abandon the sortal dependency thesis as a whole. The next chapter discusses the consequences of the abandonment of the sortal dependency thesis and gives the outline of an alternative theory of individuation.

5 Identity, Individuation and Biology

We should, at the end of these investigations and after the rejection of the sortal dependency thesis, return to the themes of our discussion: identity and individuation. This chapter will shortly revisit and integrate the results from the preceding chapters and indicate what the resulting theory of identity and individuation looks like. The first section argues that the results from the preceding chapters indicate that the right conception of natural kinds, is one in accordance with Locke's idea that kinds represent *nominal essences*. Next it is argued that the theory of individuation and identity based on a straightforward realism without sortal dependency is adequate to explain identity and individuation and the required concept of object as a materially coherent unity is discussed. And in the last section the consequences for metaphysics are discussed.

5.1 Natural Kinds

We should not hold that our conceptualization of organisms reflects the *real essence* of these organisms. I think that the investigations from chapter four indicate that a Lockean picture of kinds and essence is much more adequate than an Aristotelean one. That is, our conceptions of specific kinds group together individuals by *nominal essence*. This does not imply that our concepts of specific kinds are based upon arbitrary criteria. For example, we have the taxonomic practice and evolutionary principles that guide our conceptions. But as is argued in section 4.2 the taxonomic practice and a species-based conception of kinds is not strong enough to establish Aristotelean realism. The suggestion made by Wilson that natural kinds are patterns, is an accurate one: natural kinds are based upon evolutionary patterns. However, this cannot, as argued in section 4.2.4, establish that we divide individuals by *real essences*. Surely we often speak *as if* there are real kinds that underlie our natural-kind terms, but that we do so does not mean that they actually are real. I speak of cats, generally, saying that they have four paws, hunt mice and the like. But the justification for the generalization will come from individual organisms, they ground the attribution of properties to cats generally. If we re-establish the connection between natural kinds and species this way, we can justify our generalizations and the induction over individuals without having to assume any form of essentialism of natural kinds in an Aristotelean fashion. Natural kinds are then, in a trivial sense, real: they are based upon individuals. But because they allow for all kinds of vagueness and hence, though they are natural, they do not reflect *real essences* in an Aristotelean sense.

5.2 Identity, persistence and individuation without sortal dependency

We are now in a position to see how we can integrate the accounts of both identity and individuation without assuming sortal dependency. As is argued for in chapter two, identity is the simple relation any object only has with itself, so we do not need to hold sortal dependency at that point. For diachronic identity statements, it was argued that it often did not truly involve identity questions, and for *persistence*, it was argued that it is possible to understand it without supposing sortal dependency. What we needed in order for this to work was a notion of 'object' such that we are capable to understand its persistence, and we can render identity unproblematic. Chapter two indicated that this should be a notion of 'object' that depends on material coherency, and now we are able to see why this is an attractive position.

We learn from grafts and other hybrid individuals, that material coherence is much more important for the persistence of a living thing, than its being of some sort. Hence it suits biological individuals

better to treat persistence as material continuity, in the way Ayers defends.[109] According to Ayers, all that matters for a substance to persist (and thereby to remain the same thing), is that it is a material unity. A material unity, which is the bearer of the properties, is all we need for the concepts of identity and individuation. The concepts of material unity and material coherency are still somewhat unexplained, and I wish to elucidate on that a bit. For this I take a graft as example. For a grafted plant, it is important that the processes that normally occur within a plant can still continue in the grafted plant. This is ensured if the bark of the two parts of the plants merges in such a way that the fluids are again able to go up. If that process is ensured, the two parts of the plant may be called to form a coherent material unity that is able to persist through time. If it fails to establish the processes, the material unity will not be established and the two parts of the graft will die. We should conclude that the persistence of the grafted organism is not determined by its *being of a kind*, it is the material coherence that unites the two separate parts of the individual into one individual. This can be expanded to other organisms as well, for example the chimeric organisms. That the mosaic individuals can form a living organism is not *because* they are of a specific kind, it is because they are compatible in such a way that they ensure material coherency: they enable the processes necessary to ensure the material coherency of a chimeric individual, and this is also what ensures the persistence of the organism.

What it really amounts to in order for something to be materially coherent or a unity is something that does not really allow for a determinate answer: material coherency comes in degrees. It is important to note that this notion of 'object' or 'substance', therefore allows for vagueness: in many cases there will be processes that will make it difficult to see what the material coherent unity is. Degenerating wood for example displays a certain coherent structure, but in the process of degeneration the coherency becomes more and more unclear. Another example is when there is some mutualism between two organisms. In many cases the difference between the two objects of which one is a parasite slowly become dependent upon each other. Our notion of 'object' allows that it is possible that the two organisms actually become one in the case of mutualism. And I think this is a virtue of this notion of object: it *is* in many cases unclear what the object is and hence it will also be vague as to whether the object persists or not: *identity* does not allow for vagueness, but objects do. Therefore in order to determine whether an object *persists,* we should investigate whether it is still an object, whether there are processes that ensure its coherent structure and whether these processes are stable. Hence most of the questions about persistence will turn out to be *empirical questions* about the persisting objects.

5.3 Metaphysics and biology

If we take these considerations into account, we will see that many supposed metaphysical questions are no longer really metaphysical questions: they give rise to understandable *empirical* questions. If we are interested in the persistence of species for example, the appropriate questions are: how do individuals in a species behave, change, develop and reproduce? How does this affect the population? Until we can ultimately formulate an answer to how do species develop. Or, if we take our discussion of grafting and chimeras as starting point and wonder how it is possible that a graft persists, the relevant questions are: How does grafting work? What does grafting have to do with the species of the two plants grafted? What kinds of processes are required for the graft to prevent it from degenerating?

[109] (Ayers 1991b).

I think that the foregoing treatment of identity and persistence has shown that we should not start doing metaphysics without investigating the empirical sciences that provide the relevant knowledge of the phenomena that the metaphysics are supposed to be about. Many questions can be resolved by looking at the empirical sciences, in our case, biology. As we can learn from section 4.4.4, a lot of work could have been saved if we had first set the range of paradigmatic examples straight and developed a theory of living things that actually can accommodate all living things from the start. For example, it would have saved us the trouble if having to decide whether an amoeba ceases to exist when it multiplies or whether one of the two amoebas is *identical* to the other. And on a larger scale a better knowledge of the outcomes of empirical science will generate more caution and reduce the natural bias we human beings with only limited capacities have towards many topics relevant for philosophy. I think that the investigations of this paper proved that to be correct. And hence before we try to extend the investigations of persistence and identity further than biological organisms to geological formations, artifacts or even *personal identity*, I would propose we first extensively investigate the relevant empirical sciences, geology for geological formations, history and sociology for artifacts and psychology for personal identity.

5.4 Identity, persistence and metaphysics

We have now seen the consequences of our investigations. It was argued that the investigations of the preceding chapters indicated that the appropriate conception of kinds is of Lockean origin. And that we can find ground for a conception of 'object' as a material coherent unity that allows us to understand identity, individuation and persistence without sortal dependency. It was indicated that this has some consequences for the role of metaphysics with regard to questions of persistence of objects, because many of the relevant questions are, on the presented suggestion, empirical questions.

6. Concluding Remarks

Let us now, in order to conclude this thesis, summarize the results to see what we have established. The main goal of this paper was to challenge the sortal dependency thesis. Three topics of the sortal dependency thesis were distinguished, namely the topics of *identity*, our capacity to *single out* an object in experience, and *individuation.*

The sortal dependency thesis of identity defends *absolutism* with regard to identity from the charges of *relativism*. Section 2.3 argued that the arguments to avoid the thesis of *relative identity* do not establish this. It was argued that we should not try to hold on to the sortal dependency in order to avoid relative identity, but that we should regard identity as the simplest relation there is: the relation any object has with itself. Section 2.4 argued that this is compatible with a plausible account of *persistence*, the identity of an object over time, which was grounded upon the concept of 'object' as material coherent unity.

With regard to our capacity to single out objects in experience, the sortal dependency thesis claims that in order to successfully single out an object, we have to single out the object *as falling under a sortal concept*, or at least as falling under a *category* of objects.[110] Section 3.2 argued that this is a far too demanding requirement and that it is sufficient if there are spatiotemporal determinations for the objects of experience, either provided by the visual system or by accompanying concepts.

Chapter four argued against the sortal dependency thesis of *individuation*, by arguing that the concept of natural kinds as the sortal dependency theorist needs does not accommodate biological phenomena. Section 4.3 argued the required concept of natural kinds is not similar to 'species' as we learn from evolutionary biology. It was argued that the sortal dependency theorist faces a dilemma: or the concept 'natural kind' should be more fine-grained than 'species', which seems to be the strategy Wiggins has to follow, or the concept 'natural kind' should be considered to be less fine-grained than 'species', the strategy followed by Lowe. These were called the *downward* and *upward* movements respectively. Both movements were argued to be problematic: they both will result in a theory in which either some arbitrary (most likely pragmatic) choices have to be made, or wherein the sortal dependency is lost along the way. Sections 4.4 and 4.5 showed that the dilemma is inescapable and truly problematic for the sortal dependency of individuation. The occurrence of hybrids, chimeras and the considerations about amoebas and viruses showed that the class of paradigmatic examples has been too small. Hybrids and Chimeras made the move downwards problematic, while viruses showed that the move upwards is implausible. These considerations were strengthened with the examples from agricultural processes of cultivation and the process of grafting.

Chapter five integrated the results from the chapters one to four and outlined the consequences of the investigations. Section 5.1 showed that the conception of 'natural kind' compatible with the investigations of this paper is one of Lockean origin: a natural kind is generalization over individuals, grouped by nominal essence. Section 5.2 argued that the concept 'object' as material coherent unity that resulted from the considerations of chapter four is strong enough to provide the understanding of 'persistence' from chapter two. And section 5.3 indicated the further consequences for the role of

[110] The latter is only true for Lowe, not Wiggins.

philosophy and argued that the empirical sciences should have an important place in further investigations about identity and persistence.

From the considerations summarized above, I think it is safe to conclude that the sortal dependency thesis is not a tenable thesis: it is not necessary for our understanding of identity and persistence, it is implausible as thesis about our cognitive capacity of singling out objects in experience and it fails to accommodate the nature of biological individuals. What we are left with is a realist theory of identity and individuation.

Bibliography

Alberts, et al. *Essential Cell Biology.* New York: Garland Science, 2004.

Anscombe, Elisabeth. "Modern Moral Philosophy." In *Virtue Ethics*, edited by Roger Crisp and Michael Slote, 26-45. Oxford: OUP, 2007 [1958].

Aristotle. "Categories." In *The Complete Works of Aristotle*, by Aristotle, edited by J. Barnes, translated by J.L. Ackrill, 3-24. Princeton: Princeton University Press, 1985.

Ayers, Michael. "Locke Versus Aristotle on Natural Kinds." *The Journal of Philosophy* 78 (1981): 247-272.

Ayers, Michael. *Locke: Epistemology and Ontology.* London and New York: Routledge, 1991a.

Ayers, Michael. "Substance: Prolegomena to a Realist Theory of Identity." *Journal of Philosophy* 88 (1991b): 69-90.

Bennett, J. *Locke, Berkeley, Hume.* Oxford: Oxford University Press, 1971.

Bennett, J. “Substratum.” *History of Philosophy Quarterly* 4 (1987): 197-215.

Boulter, Stephen. "Modality and Explanation in Biology." *Paper at the workshop "What is Really Possible?".* Utrecht, 2011. See http://phil.uu.nl/~tmueller/WIRP1/WIRP1_Boulter.pdf.

Campbell, J. *Reference and Conciousness.* New York: Oxford University Press, 2002.

Dennett, Daniel. "Real Patterns." *Journal of Philosophy* 88 (1991): 27-51.

Dupré, J. *The Disorder of Things.* Cambridge, Mass: Harvard University Press, 1993.

Foot, Philippa. *Natural Goodness.* New York: OUP, 2001.

Frege, Gottlob. *Foundations of Arithmetic.* Translated by J.L. Austin. Oxford: Oxford University Press, 1953 [1884].

Frege, Gottlob. "On Sense and Reference." In *Translations from the philosophical writings of Gottlob Frege*, by P.T. Geach and M. Black, translated by Max Black, 56-78. Oxford: Basil Blackwell, 1952 [1892].

Gallois, Andre. "Identity Over Time." Edited by Edward N. Zalta. *The Stanford Encyclopedia of Philosophy* (Spring 2011 Edition) (URL: <http://plato.stanford.edu/archives/spr2011/entries/identity-time/>).

Geach, P.T. *Logic Matters.* Berkeley: University of California Press, 1980 [1972].

Geach, P.T. *Reference and Generality.* New York: Cornell University Press, 1962-8/1980.

Ghiselin, M. "A radical solution to the species problem." *Systematic Zoology* 23 (1981): 536-44.

Hacking, I. "A Tradition of Natural Kinds" *Philosophical Studies* 61 (1991): 109-126.

Hobbes, Thomas. *De Corpore.* Vol. 11, in *The English Works of Thomas Hobbes*, edited by W. Molesworth. London: John Bohn, 1839-45 [1655].

Hull, David L. "A Matter of Individuality." *Philosophy of Science* 45 (1987): 335-60.

Kotpal. *Modern Text Book of Zoology: Invertebrates.* Meerut, India: Rakesh Kumar , 2009.

Lewis, D.K. *On the Plurality of Worlds.* Oxford: Blackwell, 1986.

Liebers, Dorit, Peter de Knijff, and Andreas Helbig. "The herring gull complex is not a ring species." *Proceedings of the Royal Society London Biological Sciences* 271 (2004): 893-901.

Locke, John. *An Essay Concerning Human Understanding.* Edited by Kenneth P. Winkler. Indianapolis: Hackett Publishing company Inc., 1996 [1689].

Lowe, Jonathan. *More Kinds of Being.* Oxford: Wiley-Blackwell, 2009.

Lowe, Jonathan. "Sortals and the Individuation of Objects." *Mind and Language* 22 (2007): 514-533.

Lowe, Jonathan. *The Four Category Ontology.* New York: Oxford University Press, 2006.

Lowe, Jonathan. "What is a Criterion of Identity?" *The Philosophical Quarterly* 39 (1989): 1-21.

Mayr, Ernst. *What Evolution is.* London: Phoenix, 2002.

Mayr, Ernst. *What Makes Biology Unique.* Cambridge: CUP, 2004.

Mertens, Jochen, and Martin Packert. "Ring species – Do they exist in birds?" *Zoologische Anzeiger* 246 (2007): 315-324.

Mooney, H, and E Cleland. "The evolutionary impact of invasive species." *Proceedings of the National Academy of Sciences colloquium: The Future of Evolution.* Irvine, CA: The National Academy of Sciences, 2001. 5446–5451.

Moyal, Ann Mozley. *Platypus: The Extraordinary Story of How a Curious Creature Baffled the World.* Baltimore: The John Hopkins University Press, 2004.

Polzin, V., et al. "Production of Sheep-goat Chimeras by Inner Cell Mass Transplantation." *Journal of Animal Science* 65 (1987): 325-330.

Putnam, Hilary. "Is Semantics Possible?" In *Mind, Language and Reality: Philosophical Papers*, by Hilary Putnam, 139-152. Cambridge: CUP, 1975a.

Putnam, Hilary. "The Meaning of 'Meaning'." In *Mind, Language and Reality: Philosophical Papers*, by Hilary Putnam, 215-271. Cambridge: CUP, 1975b.

Quine, W.V.O. *From a logical point of view.* Cambridge MA: Harvard University Press, 1953.

Ridley, Mark. "Principles of Classification." In *Philosophy of Biology*, edited by Michael Ruse, 229-241. New York: Prometheus Books, 2007.

Rong, Yang, Cai, and Wei. "Fertile mule in China and her unusual foal." *Journal of The Royal Society of Medicine* 78 (1985): 821-825.

Shoemaker. *Self-Knowledge and Self-Identity.* Ithaca: Cornell University Press, 1963.

Sider, Theodore. "Bare Particulars." *Philosophical Perspectives* 20 (2006): 387-97.

Thompson, Michael. *Life and Action.* Cambridge Massechusetts: Harvard University Press, 2008.

Tilney-Bassett, R.A.E. *Plant Chimeras.* London: Edward Arnold Publishers, 1986.

Wake, David B. "Incipient species formation in salamanders of the Ensatina complex." *Proceeding of the National Academy of the Sciences USA* 94 (1997): 7761-7767.

West-Eberhard, Mary Jane. *Developmental Plasticity and Evolution.* New York: Oxford University Press, 2003.

Wiggins, David. "Putnam's doctrine of natural kind words and Frege's doctrines of sense, reference and extension: can they cohere?" In *Frege, sense and reference one hundred years later*, by J.I. Biro and P. Kotkáto, 59-74. Dordrecht: Kluwer Academic Publishers, 1995.

Wiggins, David. *Sameness and Substance Renewed.* Cambridge: CUP, 2001.

Wilson, Jack. *Biological Individuality.* Cambridge: CUP, 1999.